

creative computing[®]

the #1 magazine of computer applications and software

February 1984
Vol. 10, No. 2
\$2.95

Computer
Graphics

In-Depth Evaluations:

- ACT Apricot
- Eagle PC-2
- SuperSprite
- Arcade Board
- Apple Graphics Software
- Educational Programs

New Products From Applefest

Audio Animation For Atari

Curve Design For TRS-80

Moiré Patterns

Hidden Surface Removal

MSX Graphics

CBasic Clinic

Columns:

- Notebook Computers
- Printers
- Telecommunications
- Atari
- Commodore
- IBM PC
- TRS-80





**You're traveling through 140° terrain
at 300 rpm.**

Only one disk guarantees safe passage through the torrid zone of drive heat. Maxell.

A lifetime warranty. And manufacturing standards that make it almost unnecessary.

Consider this: Every time you take your disk for a little spin, you expose it to drive heat that can sidetrack data. Worse, take it to the point of no return. Maxell's unique jacket construction defies heat of 140°F. And keeps your information on track.

And Maxell runs clean. A unique process impregnates lubricants throughout the oxide layer. Extending media and head life. How good is Gold?

Maxell's the disk that many drive manufacturers trust to put new equipment through its paces. It's that bug-free.

So you can drive a bargain. But in accelerated tests, Maxell floppys lead the industry in error-free performance and durability. Proving that if you can't stand the heat you don't stand a chance.

maxell®
IT'S WORTH IT.



ENTER... THE FUTURE!

TURBO PASCAL

Introductory offer
\$49.95

**THIS IS THE PASCAL COMPILER
EVERYBODY'S BEEN WAITING FOR...
EVERYBODY EXCEPT THE COMPETITION!**

Extended Pascal for your IBM PC, APPLE CP/M, MS DOS, CP/M 86, CCP/M 86 or CP/M 80 computer features:

- Full screen interactive editor providing a complete menu driven program development environment.
- 11 significant digits in floating point arithmetic.
- Built-in transcendental functions.
- Dynamic strings with full set of string handling features.
- Program chaining with common variables.
- Random access data files.
- Full support of operating system facilities.
- And much more.

ORDER YOUR COPY OF TURBO PASCAL TODAY TO TAKE ADVANTAGE OF OUR INTRODUCTORY SPECIAL.

For Visa and MasterCard orders call toll free

1-800-227-2400 X 968

IN CA: 1-800-772-2666 X 968
(lines open 24 hrs. a day, 7 days a week)

Dealer & Distributor Inquiries welcome.

	Turbo Pascal	IBM Pascal	Pascal MT+
PRICE	49.95	300.00	595.00
Compile & Link speed	1 second!!!	97 seconds	90 seconds
Execution speed	2.2 seconds	9 seconds	3 seconds
Disk Space 16 bit 8 bit	33K w editor 28K w editor	300K + editor Not Available	225K + editor 168K + editor
8 and 16 bit	YES	NO	YES
built-in editor	YES	NO	NO
Generate object code	YES	YES	YES
One pass native code compiler	YES	NO	NO
Locates RunTime errors directly in source code	YES	NO	NO

Benchmark data based on EightQueens in "Algorithms + Data Structures + Programs" by N. Wirth, run on an IBM PC.
Turbo Pascal is a trademark of Borland International. MT+ is a trademark of MT MicroSystems. IBM is a trademark of International Business Machines.

LEARN TO WRITE A SPREADSHEET

Our introductory offer includes MICROCALC, a spreadsheet written in Turbo Pascal. It will be on your disk, and ready to run. And we've included the source code to show you exactly how a spreadsheet is written! (Introductory offer expires March 1, 1984)

Turbo Pascal includes a 250 page bound manual with extensive explanations and many illustrative examples.

Turbo Pascal \$49.95 + \$5.00 shipping per copy.

Check _____ Money Order _____
VISA _____ MasterCard _____

Card #: _____
Exp date: _____ Shipped UPS

BORLAND INTERNATIONAL

Borland International
4807 Scotts Valley Drive
Scotts Valley, California 95066

My system is: 8 bit _____ 16 bit _____

Operating system: CP/M 80 _____

CP/M 86 _____ MS DOS _____ PC DOS _____

Computer: _____ Disk Format: _____

Please be sure model number and format are correct.

NAME: _____

ADDRESS: _____

CITY/STATE/ZIP: _____

TELEPHONE: _____

California residents add 6 1/4% sales tax. Outside North America add \$15.00. Checks must be on a U.S. bank, and in U.S. dollars. Sorry, no C.O.D.

Introducing UltraFile:™ the most flexible management tool you'll ever need.



Have you ever misplaced an important piece of paper? Or had to work late just to put together a report for tomorrow morning's meeting? Or felt that you can't get at all the facts and figures that surround you?

It can be very frustrating. But it doesn't have to be.

Whether you need to process large amounts of information in business or just want to catalog your home library, UltraFile can do it for you. Because it's as powerful as it is easy to use.

UltraFile is the best reason there is for owning a computer.

SAVE COUNTLESS HOURS.

UltraFile can manage and organize your information in hundreds of different ways, no matter what your need. Here's one example:

You as sales manager know sales can be increased dramatically by concentrating on cities that have a population of at least 500,000 or an average income of at least \$9,500. But which cities fit into those categories?

UltraFile can tell you. Instantly. UltraFile can pull the data out of a file of information and do calculations and even make projections.

Then, if you'd like to see the information on your screen or want a printout, just tell UltraFile in plain English and it will do it for you.

What's more, with UltraFile you can

make revisions at any point without having to start all over.

TYING IT ALL TOGETHER.

UltraFile has a very easy-to-use, yet sophisticated and accurate "graphing" system. And it's fun, too.

Suppose you'd like to review information in graphic form to make a visual comparison. Just "point" to the kind of graph you want to see, whether it's 3-dimensional bar, circle or area graph (to name a few), and UltraFile does the rest.

One of the best parts about UltraFile's graphing capabilities is the ability to actually do calculations right on the screen. In seconds. Just pinpoint a spot anywhere on the graph, press a button and you automatically get a numerical readout. It's that easy.

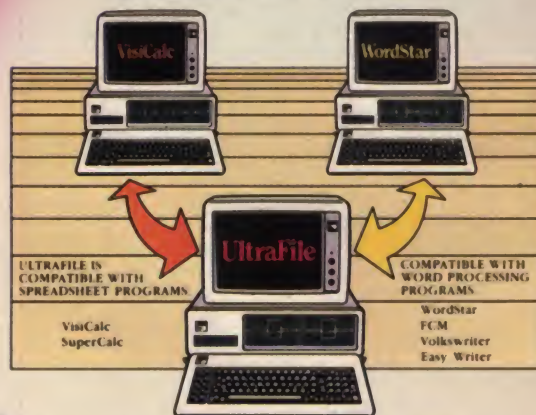


3 FOR THE PRICE OF 1.
File, Report, Graph in one easy program.
UltraFile: \$195 complete.

ULTRAFILE ADDS NEW DIMENSIONS TO YOUR OTHER SOFTWARE PROGRAMS.

We taught UltraFile to talk to the most popular word processing and spreadsheet programs: VisiCalc, WordStar, SuperCalc, FCM, Volkswriter and Easy Writer. And that means you get the best of both worlds.

You can pull information from your "file" and put it into a letter or use it to do more complex calculations on a spreadsheet. And vice versa.



The point is, UltraFile can easily and efficiently solve *your* information problems.

In fact, UltraFile gives you dozens of good reasons for owning a computer.

So stop by your Continental Software dealer. Or call us today to find out more about UltraFile and how it will help you get a grip on information.

UltraFile is available for the IBM PC and IBM PC XT.

UltraFile and FCM are registered trademarks of Continental Software. IBM PC/PC XT are registered trademarks of International Business Machines Corp. VisiCalc is a registered trademark of VisiCorp Personal Software. WordStar is a registered trademark of MicroPro International, Inc. SuperCalc is a registered trademark of Sorcim Corp. Easy Writer is a registered trademark of Information Unlimited Software, Inc. Volkswriter is a trademark of Lifetree Software, Inc.

ULTRAFILE: Get a grip on information.



**Continental
Software**

A division of Arrays, Inc.

11223 South Hindry Avenue
Los Angeles, California 90045
213/417-8031, 213/417-3003

CIRCLE 115 ON READER SERVICE CARD

In This Issue

Evaluations & Profiles

- 14 ACT Apricot** Anderson
An innovative, high quality machine
- 28 Eagle PC-2** Ahl
An IBM compatible with excellent software
- 40 SuperSprite And Arcade Board** Arrants
An new way to do Apple Graphics
- 44 Easel** Mackowiak
A system for artists
- 52 Apple Graphics Software** Arrants
Five exciting new packages
- 67 Growing Up Literate** Staples
Key Lingo, WordWorx, and Watch Your Language

Articles

- 74 Microsoft Windows** Ahl
23 manufacturers pledge support
- 80 Byte Gallery** Anderson
A portfolio of artists and microcomputers
- 88 An Editor At Applefest** Ahl
Bushels of new products
- 111 Report From The AMOA Games Show** Uston
Will lasers save the coin-op industry?
- 128 The CBasic Clinic** Libertine
Files, records, fields, and variables

The Cover: The top photo, by Glenn Entis, Pacific Data Images, was made with 3-D animation software written at Pacific Data Images on a VAX 11-750. The middle photo, Toroids over linoleum with shadows, was created by Stan Cohen of Advanced Technology Systems. The geometric donut shape was generated by a procedural object program on a VAX 11-780. The image was generated by software written at Advanced Technology Systems. The bottom photo is by Lauretta Jones, a freelance artist. The image was created on an Apple computer.

February, 1984
Volume 10, Number 2



Creative Computing (ISSN 0 097-8140) is published monthly by Ahl Computing, Inc., a subsidiary of Ziff-Davis Publishing Company. David Ahl, President; Elizabeth B. Staples, Vice President; Selwyn Taubman, Treasurer; Bertram A. Abrams, Secretary. P.O. Box 789-M Morristown, N.J. 07960. Second Class Postage paid at Los Angeles, CA 90052 and additional mailing offices.

Copyright © 1983 by Ahl Computing, Inc. All rights reserved.
Editorial offices located at 39 East Hanover Ave., Morris Plains, NJ 07950. Phone (201) 540-0445.

Domestic Subscriptions: 12 issues \$24.97; 24 issues \$43.97; 36 issues \$57.97.
POSTMASTER: send address changes to Creative Computing, P.O. Box 5214, Boulder, CO 80321. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription.

Applications & Software

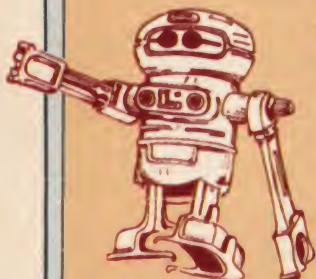
- 138 Audio Animation** Multer
Synchronized sight and sound for Atari
- 142 Curve Design** Rudeen
Blending parabolas on the TRS-80
- 148 Plotter Tutorial** van de Panne
Part 3: Thinking in 3-D
- 165 Spectrum** Shaw
A colorful look at graphics
- 174 How To Get Moiré From Your Computer** Gardner
Patterns you can see through
- 189 Removing Hidden Surfaces** Rost
A simple algorithm for making better graphics
- 204 MSX Screen Graphics** Ahl
A tutorial on the new standard

Departments

- 6 Notices** Fee
- 6 A Note To Our Readers** Staff
- 8 Benchmark Results** Ahl
- 10 Street Price Index** Ahl
Who's selling what for how much?
- 12 7 Years Ago** Ahl
The way we were
- 210 Notebook/Portable Computing** Machrone
Speeding up loop calculations in Basic
- 212 Print About Printers** Ahl
The Strobe Model 260 and Laser PP40 plotters
- 222 Computing For The Handicapped** Talmy
The Voice Input Module
- 226 Telecommunications Talk** Murphy
Information utilities
- 232 Commodore's Port** Anderson
The Portable 64 and comments on youth
- 240 Outpost: Atari** Leyenberger
No frills software
- 246 IBM Images** Glinert-Cole
Death, taxes, and the PCjr
- 252 TRS-80 Strings** Gray
Transportable 4, Color Scripsit, and Quikpro+ Plus 2

Staff

Founder/Editor-in-Chief	David H. Ahl
Editor	Elizabeth B. Staples
Managing Editor	Peter Fee
Associate Editors	John Anderson Stephen Arrants, Jr.
Editor-at-Large	Ken Uston
Contributing Editors	Dale Archibald Charles Carpenter Will Fastie Susan Gilnert-Cole Danny Goodman Stephen B. Gray Glenn Hart Stephen Kimmel Art Leyenberger Brian Murphy Ted Nelson Peter Payack Alvin Toffler
Copy Editor	Sherrie Van Tyle
Editorial Assistants	Andrew Brill Laura Gibbons
Secretary	Diane Koncur
Art Director	Patrick Calkins
Assistant Art Director	Chris DeMille
Artists	Diana Negri Rudlo Eugene Bicknell Paul Krasner
Typesetting	Karen K. Brown
Advertising Director	Claude P. Sheer
Creative Computing Press	Laura Conboy
Branch Manager	Jennifer H. Shaler
Administrative Assistant	Joanne Sapio
Operations Manager	Dan Nunziato
Retail Marketing	Susan DeMark
Customer Service	Renea Cole Cross
Fulfillment	Frances Miskovich Rosemary Bender Linda Blank Pat Champion Elsie Graff Linda McCatharn Carol Vitta Jim Zecchin Diane Moran Barbara Carnegie Lisa Dickisson Maura Russell Donna Stiefel Cheryl Schauble Valerie Gaddis
Shipping & Receiving	Ronald Antonaccio Craig A. Brown Richard Crawford Michael Iacangelo William Sprouls John Ziegenfuss



Advertising Sales

Advertising Director
Claude P. Sheer
Creative Computing
Ziff-Davis Publishing Company
One Park Avenue
New York, NY 10016
(212) 725-3449

Advertising Coordinator
Ruth Darling
Creative Computing
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-3446

Northern California, Northwest
Jeff Miller
Ziff-Davis Publishing Company
3030 Bridgeway Blvd.
Sausalito, CA 94965
(415) 331-7133

Southern California, Southwest
Tom Whiteway
Ziff-Davis Publishing Company
3460 Wilshire Blvd.
Los Angeles, CA 90010
(213) 387-2100

New England
CEL Associates, Inc.
27 Adams Street
Braintree, MA 02184
(617) 848-9306

Midwest
Jeff Edman
William Biff Fairclough
The Pattis Group
4761 W. Touhy Ave.
Lincolnwood, IL 60646
(312) 679-1100

Mid-Atlantic
Larry Levine
Ziff-Davis Publishing Company
One Park Ave.
New York, NY 10016
(212) 725-7668

Southeast
Browning Publications
P.O. Box 81306
Atlanta, GA 30366
(404) 455-3430

Canada
The Pattis Group
1623 Yonge St.
Toronto, Ontario M4T 241
(416) 482-6288

Ziff Davis Consumer Computers & Electronics Magazine Division
President: Larry Sporn
Vice President/General Manager: Eileen G. Markowitz
Vice President Marketing: Jeff Hammond
Vice President Circulation: Carole Mandel
Creative Director: Peter J. Blank

Permissions

Material in this publication may not be reproduced in any form without permission. Requests for permission should be directed to Bette Amado, Ziff-Davis Publishing Company, One Park Avenue, New York, New York 10016.

Where To Send It

All editorial material, including article submissions, press releases, and products for evaluation should be sent to:

Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950

Correspondence regarding other Creative Computing products and publications should also be sent to the Morris Plains address.

Correspondence related to advertising, including ad copy, questions on billing, and requests for rates, should be sent to:

Advertising Department
Creative Computing
Ziff-Davis Publishing Co.
One Park Ave.
New York, NY 10016

Correspondence regarding subscriptions, including orders, changes of address, and problems should be sent to:

Creative Computing
P.O. Box 5214
Boulder, CO 80321

Your help in choosing the correct address for your correspondence is appreciated. An incorrectly addressed letter or package can take as long as several weeks to reach its proper destination.

Subscriptions

All subscriptions orders and other correspondence related to subscriptions should be addressed to:

Creative Computing
P.O. Box 5214
Boulder, Colorado 80321.

Foreign subscriptions must be accompanied by payment in U.S. currency.

Subscription prices:

U.S.	Canada	Foreign
1 year \$24.97	1 year 29.97	1 year 34.97
2 years 43.97	2 years 53.97	2 years 63.97
3 years 57.97	3 years 72.97	3 years 87.97

Airmail delivery on foreign subscriptions is available for a one-year period only at \$75.00 additional for mail to Asia and Australia, and \$50.00 additional for all other foreign.

Subscribers in the United Kingdom may send payment in sterling to:

Hazel Gordon
10 Bishops Way
Sutton Coldfield
West Midlands B74 4XU

Please allow at least eight weeks for change of address. Include old address as well as new—enclosing if possible an address label from a recent issue.

Attention Authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

DEDICATED?

of course not! Unless you have a KeyWiz

The only thing standing between your \$3000 PC and a \$20,000 dedicated PC is a....

keywiz®



keywiz VIP
(Very Intelligent Peripheral)

User-defineable function keys, with up to 8 characters each, can be programmed again with shift key, giving the user 62 defined keys. Four such keyboards are stored in the KeyWiz memory, easily accessed anytime, making 248 programable keys available at the touch of a button. The VIP maintains the memory even when the power is off!



Creative Computer Peripherals Inc.

Aztec Environmental Center
1044 Lacey Road, Forked River, N.J. 08731
THE BIG NAME IN SMALL COMPUTER PERIPHERALS

ORDERS ONLY 800-225-0091
INFORMATION 609-693-0002



DEALER INQUIRIES INVITED

ORDER NOW

For the: ☐ APPLE II+ ☐ APPLE IIE or ☐ FRANKLIN ACE

Standard KeyWiz '83
☐ Visicalc / Acecalc key pad w/numeric key pad 299.00

KeyWiz Convertible
☐ Visicalc / Acecalc key pad w/Word Processor 299.00

☐ Custom Key Module (Send for specs) 40.00

KEYWIZ VIP for Apple II+ ☐ or Apple IIE ☐ Franklin Ace
☐ User Definable Keyboard with plastic Applesoft Basic Template,
Pascal Template and 3 Blanks 439.00

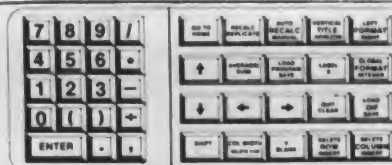
Add \$8.00 Shipping/Handling to order

6% Sales Tax in New Jersey

Send \$3.00 for our Informative Users Manual

ALSO AVAILABLE

OUR STANDARD keywiz 83



keywiz CONVERTIBLE



• Preprogrammed Auxiliary Keyboards with 30 Visicalc / AceCalc Function Keys

• Available with a Numeric Key Pad (our Model "83") or without ("Convertible" Model) works with any program.

• Also available are the listed Word Processor Function Keys. (Optionally on the "83" model for \$40.00 and provided without charge in the "Convertible" Model)

• Why waste time memorizing word processor or Calc commands or stringing key strokes together when KeyWiz utilizes single key strokes labeled in plain English. KeyWiz makes it all understandable.

• 4 Arrow Keys for full cursor positioning - a great asset to any Calc or word processor user.

• End Users - KeyWiz completes your microcomputer package.

• Dealers - KeyWiz makes it easier to sell software.

• Educators - KeyWiz sharply reduces training time and saves you \$ \$ \$.

• OEM's - Provide a preprogrammed keyboard with that software package you're marketing. Call us about Custom Key Pads.

Visicalc is a registered trademark of VisiCorp
Apple II is a registered trademark of Apple Computer, Inc.
Ace is a registered trademark of Franklin Computer, Inc.

CIRCLE 117 ON READER SERVICE CARD

Notices

Kraft Contest For Kids

Kraft (the cheese company), challenges youngsters 18 years and under to conceptualize a "kideogame" designed to teach children ages 3-8 about nutrition and good health habits.

Entries will be received until March 31, 1984, and then judged by a panel of computer experts (some of them children), educators, and nutritionists. The winners will be announced on May 1, 1984.

The Grand Prize is a trip to EPCOT Center/Walt Disney World for the winner and his/her family (up to four). Other prizes include cash and gift certificates for the purchase of computer equipment.

To receive the Official Rules and Regulations, send in a self-addressed, stamped #10 envelope to: The Kraft Kideo Game Contest, P.O. Box 845, South Holland, IL 60473.

Reviewers Wanted Writers, Too

Reviewers

Can you write clearly, concisely, and with a flair? If so, have we got an offer for you!

New products, particularly software packages, are flooding our offices. So fast, that we are having a tough time keeping up with it all.

A similar situation occurred about two years ago and we put a notice in the magazine similar to this one. From the over 6000 responses, we selected a few reviewers, the reviews from whom you have been reading since. However, several of these people have changed jobs or

computers, so we again need reviewers.

Specifically, we need people who can review software—business, educational, personal, and entertainment—on a variety of computers. Our greatest need is for reviewers with the following systems: IBM PC (or a clone), Apple, Atari, Commodore 64, Color Computer, TRS-80 Model 4, DEC Rainbow, CP/M-86 and MS-DOS.

Since we pride ourselves on reviewing products in a timely way, reviews must be turned around in two weeks. In other words, from the time you receive a product from us, the review must arrive back here in no more than 14 days. If you cannot work within this time framework, please do not volunteer.

The way the process works is that we send you a software package (or several similar packages) with an indication of how long the review should be. You prepare the review, software profile, and screen photos (if possible) and mail them to us. For your efforts, you get to keep the software, and we pay you at our regular rate.

Reviews must be typed, double spaced (a dot matrix printer is okay). The software profile must follow our standard format and be on a separate page.

To apply, please send us a review of any software package you wish (250 to 500 words for games; 1500 to 3000 words for other programs) plus a software profile. Also include your name, address, phone number, computer (complete configuration), type of software you feel qualified to review (business, personal, educational, entertainment), and whether you are able to provide high quality screen photos and/or screen prints (on a line printer).

Writers and Editors

We are also seeking someone to write a regular column on business applications. Like our machine-specific columns, this would be one that would keep readers up to date on new approaches in business software (for example, icons, integrated packages, tutorial software, and the like). It should describe new products and generally keep our readers informed about the latest advances in using small computers for business applications.

The column might also include short programs, tips for modifying commercial packages, spreadsheet techniques, and hints for using database packages.

In length, the column should run about 2000-3000 words per month. We may have two people do this column on alternating months; if you are interested, let us know your preference.

If you would like to be considered for business applications columnist, please write a sample column and send it to us along with your name, address, phone number and brief description of your qualifications.

The Garden State

If you would like to get more involved with *Creative Computing*, let us hear from you. From time to time we have openings over a wide range of positions—proofreader, technical writer, associate editor, editorial assistant. All of these positions are located in Morris Plains, a charming community about an hour west of New York City.

If a career with *Creative Computing* sounds interesting, send us a resume. We will keep it on file and get in touch with you when we have an opening that suits your qualifications.

All responses to the above should be directed to Diane Koncur, Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950.

A Note To Our Readers

Product evaluations in *Creative Computing* are different from those in many other magazines. Here's why.

A *Creative Computing* product evaluation is objective, thorough, and in-depth. Normally, we get an actual production product for testing—on loan or purchased from the manufacturer. We do not ask for or accept any special treatment, but interact with the manufacturer as a normal customer would.

In most cases, we test the product in

the environment and under the conditions in which we would expect it to be used. We do not believe that we should sit in an ivory tower and pass judgment on a product that is meant to be used by a salesman on the road or a child in a classroom.

When we evaluate a prototype, we state that fact in the review. Even so, we do not simply recite the manufacturer speci-

fications; instead, we use the product, apply our own tests, and report on the results. If it lives up to the published specs, fine; if not, we tell you.

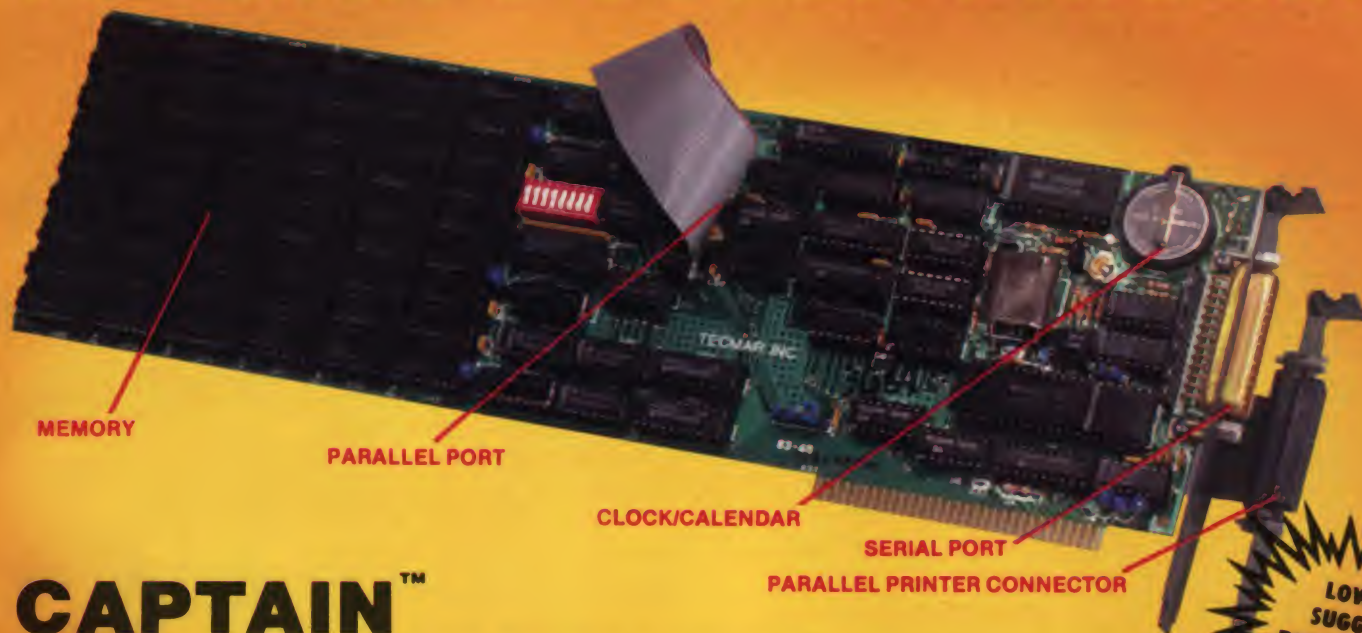
In our evaluations, we call a spade a spade and a lemon a lemon. Advertisers do not receive special treatment—no one does. Some manufacturers do not like this policy and refuse to work with us or advertise in the magazine. But most manufacturers welcome our policy of scrupulous honesty, and for that, we applaud them.

Nevertheless, we are not right all of the time. Sometimes, a unit might perform well in our tests, but be a dog for you. For that, we are sorry. But for the most part, we trust you will find our reviews—and the rest of the magazine—credible, honest, and interesting.



creative
computing
equipment
evaluation

TECMAR'S SUPER PRICES!



CAPTAIN™

TECMAR'S TOP OF THE LINE MULTIFUNCTION BOARD

Provides maximum memory expansion to 640K for the PC.

Performs eight (8) key functions in one (1) expansion slot.

- **0 to 384K MEMORY** - fully socketed for easy user upgrade in 64K blocks.
- **CLOCK/CALENDAR** - battery-powered to maintain date and time while computer is on or off.
- **SERIAL PORT** - to connect to modem or printer with full IBM PC compatibility
- **PARALLEL PORT** - fully compatible for standard IBM Parallel Printer or compatible printers. Cable and connector included.
- **RAMSPOOLER SOFTWARE (included)** - enables printing to become a background task, freeing your PC for other functions.

- **SPEED DISK SOFTWARE (included)** - simulates high speed disk drive in RAM, from 5K to 512K in 1K increments. 50% faster than a Winchester.
- **AUTOTIME SOFTWARE (Included)** - automatically enters correct date and time each time the user powers up the computer.
- **OPTION** - inexpensive PAL chip enables user to restrict availability of information on a 'need to know' basis or to limit access to proprietary software.

\$349 Unpopulated Memory

\$389/64K
\$470/128K
\$551/192K
\$633/256K
\$714/320K
\$795/384K

WAVE™ & BOSUN™ for your IBM PC/XT

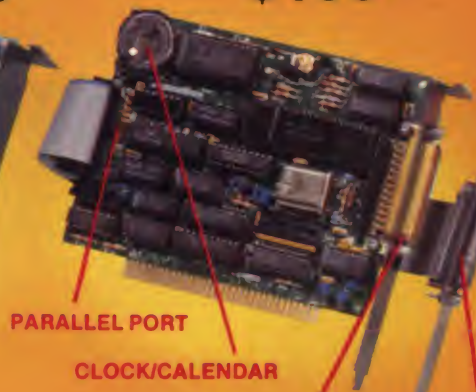
WAVE

\$299⁰⁰



BOSUN

\$195⁰⁰



WAVE™

\$299/64K

\$379/128K

\$449/192K

\$499/256K

WAVE fits into a short slot in the IBM PC/XT.

- **64K to 256K MEMORY** - fully socketed for easy field upgrade in 64K blocks.
- The following additional features are the same as Captain described above:

- RAMSpooler™ Software
- SpeedDisk™ Software

BOSUN™

BOSUN fits into a short slot in the IBM PC/XT. The following features are the same as Captain described above:

- Clock/Calendar
- Serial Port
- Parallel Port
- RAMSpooler™ Software
- Autotime™ Software
- PAL Option
- Cable and Connector

Tecmar boards have:

- **COMPATIBILITY WITH IBM PC AND OTHER LOOK ALIKES.**
 - Full one year warranty
 - **GUARANTEED 72 Hour repair turn-around**
- THESE TECMAR PRODUCTS ARE DELIVERABLE NOW!**

Tecmar, Inc.
 6225 Cochran Road
 Solon (Cleveland), Ohio 44139-3377
 Phone: (216)349-0600 Telex: 466692

TECMAR

CIRCLE 173 ON READER SERVICE CARD

Creative Computing Benchmark

The Creative Computing benchmark is a short test of computational speed, accuracy, and the random number generator in Basic. Computers in the chart are listed in ascending order of completion time of the test expressed in minutes and seconds. In the accuracy measure, the smaller the number the better (.0000001 is excellent while .187805 is poor). In the randomness measure, smaller is better (numbers under 15 are good and over 15 are fair).

Since running the short article about the benchmark test, we have been overwhelmed with responses from readers who ran the test on machines not listed in our original table. With letters still pouring in, here are the results for 115 different computers.

We have taken note of the criticisms of this simple test and are in the process of devising a more comprehensive one. Watch for a follow-up article.—DHA

```
10 ' Ahl's Simple Benchmark
20 FOR N=1 TO 100: A=N
30 FOR I=1 TO 10
40 A=SQR(A): R=R+RND(1)
50 NEXT I
60 FOR I=1 TO 10
70 A=A^2: R=R+RND(1)
80 NEXT I
90 S=S+A: NEXT N
100 PRINT ABS(1010-S/5)
110 PRINT ABS(1000-R)
```

Computer	Time	Accuracy	Random	Computer	Time	Accuracy	Random
Cray 1	0:00.01	.0000000014	6.1	Digital Group Bytemaster1	2:27	.000002779	3.6
Amdahl 470	0:00.04	.0000000011846	12.4	NEC PC-8001A	1:29	.0338745	3.0
DEC System 10	0:00.18	.00494385	8.9	Atari 800 (MBasic)	1:35	.150879	2.1
DEC VAX 11/780	0:01	.0113525	5.3	Kaypro II	1:36	.187805	7.5
DEC VAX 11/780 (double)	0:015	.00000000163283	5.3	Sony SMC-70	1:37	.0000000458	3.8
HP 9845B (390 bit slice)	0:03	.00000882	23.1	HP-75C	1:38	.00000002	5.8
Control Data Cyber 730	0:03	.00000000355	6.1	North Star Horizon(10 dig)	1:41	.000473	3.6
HP 3000 Series 44	0:04	.112549	12.9	NEC PC-8201	1:44	.187805	9.3
HP 9836	0:05	.00000000127329	5.5	MicroOffice RoadRunner	1:48	.187805	7.4
Wang 2200 SVP	0:05	.000000076	3.9	Teleram 3000	1:48	.187805	7.4
Stearns Micro	0:08	.005859375	7.1	Apple III	1:48	.011914	6.7
Burroughs B20	0:09	.005938744544977	3.2	Vic 20	1:49	.0010414235	23.7
Alpha Micro AM 100T	0:10	.00000387337	12.4	Commodore SuperPET	1:50	.000209331512	20.4
HP 9825	0:11	.00000882	9.1	HP 9830B	1:52	.000000889	13.1
Burroughs B22	0:12	.005859375	15.7	Commodore 64	1:53	.0010414235	8.9
NEC Adv Pers Comp	0:12	.005859375	7.2	Apple II plus	1:53	.0010414235	12.0
Tektronix 4054	0:12	.000000014042598	8.5	Apple IIe	1:53	.0010414235	12.0
Olivetti M20	0:13	.0114136	6.2	NEC PC-8801A	1:54	.187805	7.4
Saybrook 68000 (in Apple)	0:13	.0000000011	10.4	Rockwell Aim 65	1:56	.00104141235	14.7
TI Professional	0:15	.005859375	7.1	Compucolor II	1:57	.0338745	1.4
Compaq	0:15	.005859375	7.1	TRS-80 Model III	1:59	.0338745	5.8
HP 9845B	0:15	.00000882	23.1	Micro Color Computer	1:59	.000596284867	7.6
Zenith Z-100 (8080)	0:17	.005859375	9.7	Commodore CBM 8032, 2001 2:01		.0010414235	1.4
Samurai S16	0:17	.01159668	6.3	Heath/Zenith H-89A	2:04	.187805	7.4
ACT Apricot	0:18	.005859375	7.2	Atari 2600 Graduate	2:15	.000224679708	7.9
Sharp PC-5000	0:18	.005859375	7.2	TRS-80 Model I	2:19	.0338745	12.0
Eagle PC-2	0:19	.005859375	7.2	Color Computer	2:23	.000596284867	7.3
DEC Rainbow 100	0:20	.005859375	7.2	Atari 800 (fastchip)	2:23	.006375	7.0
Acorn BBC Computer	0:21	.0000128746033	5.2	Dragon 32	2:29	.000596284867	7.3
Columbia MPC	0:21	.005859375	7.2	Epson HX-20	2:36	.0338745	23.8
Computer Devices DOT	0:22	.005859375	7.1	DAI	2:38	.210266	9.6
IBM PC	0:24	.01159668	6.3	Timex/Sinclair 1000 (fast)	2:43	.00041294098	8.7
GCE Vectrex	0:33	.0753174	0.9	Interact Model R	2:50	.0338745	8.1
TI DS990/12 (Mini TS)	0:36	.0000000388	3.1	Wang 2210	2:52	.000011432	12.5
Laser 2001	0:40	.0003272295	17.4	OSI Challenger 1	3:07	.0010414235	13.9
Memotech MX-512	0:46	.000252962112	6.9	SpectraVideo 318/328	3:40	.0000002058	0.7
HP 9020C	0:48	.00000000127329	23.2	TI 99/4A	3:46	.00000011	2.6
Lobo Max-80	0:48	.0338745	5.8	Radio Shack PC-3	4:00	.00000627	10.9
Lynx	0:51	.155	14.1	TI 99/4A, Extended	4:10	.00000011	10.7
TRS-80 Model 4	0:53	.0670776	6.5	Oric-1	4:10	.00104141235	12.1
Panasonic JR200	0:57	.00021481514	15.1	Datapoint 1800	4:16	.0000012042	11.3
SCS 100	0:59	.187805	7.4	Sinclair ZX81	4:23	.0006685257	6.3
IMS 8000	0:59	.187805	9.6	Sinclair Spectrum	4:39	.0006685257	3.5
Alspa ACI-1	0:59	.187805	7.4	TRS-80 Model 100	4:54	.0000002058	0.7
DECmate II	0:59	.187805	7.4	Casio FP-200	5:05	.00723	30.3
Xerox 820-II	0:59	.187805	7.4	Sharp PC-1500 (RS PC-2)	5:10	.0000288	7.8
Vector Graphic 3 VIP	1:04	.0338745	7.5	Cromemco C-10	5:18	.00000001	16.1
Zenith Z-100 (8085)	1:04	.187805	9.5	TI CC-40	5:41	.00000011	6.2
Toshiba T100	1:09	.187805	7.4	Sanyo PHC-25	5:41	.000267505646	10.2
Epson QX-10	1:09	.187805	7.4	Canon X-07	6:03	.0000002058	24.9
Osborne 01	1:10	.187805	7.4	Atari 1200XL	6:45	.013959	5.2
Mattel Aquarius	1:17	.187805	10.0	Atari 400/800	6:48	.012959	22.8
Epson QX-10	1:18	.187805	7.4	Sharp PC-1250	11:14	.0000288	5.9
HP-85A	1:20	.00000002	14.3	Timex/Sinclair 1000(slow)	16:55	.00041294098	7.4
OSI Challenger 1P	1:20	.32959	5.5	IBM System 23	19:00	.0000005503	3.4
Morrow MD3 (Bazic 10)	1:21	.000473	3.6	HP-97	23:00	.000034	---
HP-86A, B	1:25	.00000002	13.6	Sharp PC-1211	28:32	.00002882	---
Tektronix 4051	1:26	.000000014042598	8.1				

REMEMBER.



ELEPHANT™ NEVER FORGETS.

A full line of top-quality floppies, in virtually every 5 1/4" and 8" model, for compatibility with virtually every computer on the market. Guaranteed to meet or exceed every industry standard, certified 100% error-free and problem-free, and to maintain its quality for at least 12 million passes (or over a lifetime of heavy-duty use).

Contact Dennison Computer Supplies, Inc., 55 Providence Highway, Norwood, MA 02062 or call toll-free 1-800-343-8413.
In Massachusetts, call collect (617) 769-8150. Telex 951-624.

Dennison

CIRCLE 120 ON READER SERVICE CARD

Street Price Index

The Creative Computing Street Price Index is an on-going monitor of the average price levels of selected computers, peripherals, video games and related accessories in the real-world marketplace. The list price is the price set by the manufacturer for the product when it was first announced, and is not necessarily the current manufacturer list price.

As time goes on, this Index will be presented in graphical form, but until there are six or seven data points, a graph would be of little value.

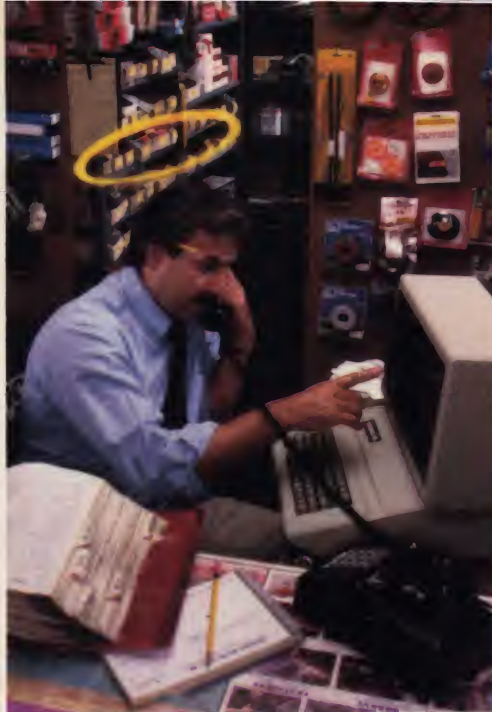
This Index is not intended to be a purchasing guide. Frequently, the

lowest price for a computer will be offered by a vendor who is going out of business or closing out that particular item. Unless you are convinced you will never need service or are skillful enough to repair an unhealthy computer yourself, you would probably not want to buy a machine from such an outlet.

Furthermore, most of our price monitoring is done in major metropolitan areas on the two coasts. Prices outside of large cities and in the central part of the country are usually higher.

Computer	Orig List Price	Dec. 1983.....Monthly.....			Month Ago	Year Ago
		High	Low	Average		
Apple IIe (64K, 40-col)	1395	1395	1149	1260	1260	n/a
Atari 400, 16K	559	169	29(1)	99	159	352
Atari 800, 48K	999	399	179(1)	289	374	863
Atari 1200, 64K	899	679	249(1)	464	464	n/a
Commodore Vic-20	297	149	69	109	109	274
Commodore 64	599	299	179(1)	239	289	n/a
Osborne 1, 64K	1795	1295	800	1047	1390	1895
Radio Shack:						
Color Comp, 16K	399	189	149	169	179	399
Model 4, 64K	999	999	799	899	999	n/a
TI 99/4A, 16K	635	149	50	100	167	299
Timex 1000, 2K	99	45	29	38	43	149
Average home com- puter (up to 16K)	398	200	97	142	143	295
<u>Line Printer</u>						
Epson FX-80	699	599	519	559	559	n/a
Epson MX-80FT	745	449	395	425	450	567
NEC PC-8023A	795	475	379	427	427	599
Okidata 82A	799	449	355	402	407	549
Okidata 92	699	559	439	500	524	n/a
Star Gemini 10	449	359	269	314	319	n/a
Average 80-col dot matrix printer	697	482	393	394	467	572
<u>Video Games</u>						
Atari 2600	199	99	49(1)	74	77	149
Atari 5200	269	200	118(1)	159	174	n/a
Colecovision	199	189	119	154	156	n/a
Intellivision II	199	150	59(1)	105	110	189
Average video game	216	145	86	91	118	169
<u>Dynamic Memory Chips (200 ns, quantity 8)</u>						
16K x 1 bit (4116) ...		1.95	1.50	1.73	1.50	1.56
64K x 1 bit (4164) ...		7.49	5.75	6.62	5.95	n/a

(1) Includes a manufacturer rebate or equivalent



Meet Tom, Dick and Jeri. Before they had SAVVY® they were just like you.

Now you can teach your IBM or Apple personal computer that... to err is human and to forgive is SAVVY.

SAVVY is the most "forgiving" software ever developed for your IBM® PC, IBM XT, Apple IIe,® Apple II Plus,® Apple-compatible or IBM-compatible personal computer.

SAVVY is totally integrated. It's a database building system, natural programming language, file manager and operating system all in one.

SAVVY recognizes your plain-language commands. You can misspell, mistype, abbreviate, or rephrase and still command your computer successfully and easily.

SAVVY PC™ offers mainframe performance to business managers, professional programmers and systems software developers who use the IBM PC or XT.

For Apple users there's SAVVY One™: ideal for use at home or in the classroom, SAVVY Pro™: designed for professional program developers and Business SAVVY: featuring easy-to-use applications such as accounts payable, accounts receivable, general ledger, document writer and others.

Select the SAVVY that's right for you. Tom, Dick and Jeri have. Call 800-551-5199 (In New Mexico, 505-242-3333) to arrange your free demonstration of SAVVY at your local computer store. For more information circle and return the reader service card.

SAVVY is a product of Excalibur Technologies Corporation, 800 Rio Grande Boulevard N.W., Mercado 21, Albuquerque, New Mexico 87104.

**Dealer Inquiries
Invited**

SAVVY®

A product of **Excalibur**
TECHNOLOGIES CORPORATION



SAVVY is a registered trademark of Excalibur Technologies Corporation. SAVVY One, SAVVY Pro and SAVVY PC are trademarks of Excalibur Technologies Corporation. Apple is a registered trademark of Apple Computer Inc. Apple IIe and Apple II Plus are trademarks of Apple Computer Inc. IBM is a registered trademark of International Business Machines Corporation.

CIRCLE 142 ON READER SERVICE CARD

7 Years Ago

In the Jan/Feb 1977 issue, we ran reviews of two significant systems of the day, the IMSAI 8080 and the SWTPC 6800. The IMSAI was an S100 bus machine and had big rocker switches on the front panel instead of the mini toggle switches on the Altair. It took us about 40 hours to assemble the basic machine and six to eight hours more for each board. Interestingly, it is still in daily operation as a word processor with a Qume Sprint 5 and *Electric Pencil*.

The Southwest Technical Products 6800 was based on the Motorola 6800, an excellent mpu, but one which just never caught on. Construction time was shorter (16 hours) and the \$395 price was low (for 1977), although it included only 2K of memory.

We also reviewed the Teletype Model 43 terminal. This could have been a real winner but for the fact that Teletype wasn't interested in selling it to end users.



We announced the first West Coast Computer Faire (4/15 to 4/17/77), the winners from the 1976 National Student Computer Fair (the last one ever held), the solution of the four-color map problem by Ken Appel and Wolfgang Haken, and a new magazine, *Kilobaud*.

A fascinating article discussed a class of problems in which complexity grows exponentially and is believed incapable of exact solution even on the fastest computers.

This was our second "slick" issue and advertisers flocked to our pages. We had ads for the SWTPC 6800, Cromemco joysticks (the first available, \$95 each), Ohio Scientific Challenger (6502-based with 1K, \$439), Processor Technology Sol-20 (first self-contained computer, \$995 for kit version with 1K), Altair 8800b, and scores of books, boards, and other items. —DHA

**SAMS APE ESCAPE
BRINGS OUT THE ANIMAL IN YOU.**

Introducing Sams APE ESCAPE, the fast-action game that will have you scaling tall buildings, riding balloons, avoiding hazards and evading capture at heights that would scare even King Kong.

The higher you climb, the faster the action. And with no end to the buildings, there's no end to the fun! Play APE ESCAPE alone or test your skill by trying to top someone else's best score. Either way, it's sure to bring out the animal in you!

APE ESCAPE, for any Apple II®-compatible system, No. 26166, \$29.95.

Don't monkey around, buy APE ESCAPE today! Visit

**your local Sams dealer. Or
call Operator 106 at 317-
298-5566 or 800-428-SAMS**

Sams™

Howard W. Sams & Co., Inc.
4300 West 62nd Street, P.O. Box 7092
Indianapolis, IN 46206

Offer good in USA only. Prices subject to change without notice. In Canada, contact Lembrock Electronics, Markham, Ontario L3R 1H2. Apple II is a registered trademark of Apple Computer, Inc.



THE BEST REASON FOR HAVING A HOME COMPUTER.

Your children. That's why we created the Early Games series for them. We're educators as well as computer specialists. We create games that teach children important skills.

There are five programs in the Early Games series. **Early Games for Young Children** is a set of nine entertaining activities for children 2½ to 6. They can work with numbers and letters and create colorful pictures. **Matchmaker** uses shapes, sizes, directions and colors to help children develop reading

readiness skills. Children ages 5 to 12 can learn to play melodies with **Early Games Music**. Our **Piece of Cake** turns math problems into, well, a piece of cake. And **Fraction Factory** takes the work out of fractions.

Early Games feature multiple activities, easy to use picture menus, and colorful graphics. The games are fun, children love to play them! That's why they learn from them.

And they're the best reason for having a home computer.



counterpoint software inc.

ACT Apricot

John J. Anderson

The British are most definitely coming. In last month's coverage of the Personal Computer World Show in London, we reported as much. Machines such as the BBC educational micro are destined to have an impact not only in the United Kingdom, but worldwide.

This very much includes the "States," as the Brits call us. While we have managed to maintain a technological lead, the British have had something of an edge on the U.S., at the least in their acceptance and interest in microcomputing for the last couple of years. That has lately translated into a design edge and has now begun to show in a new generation of innovative entries that compete quite well with American machines. And nowhere is that edge more evident than in the Apricot from ACT.

Before we get into trouble with some of our friends across the sea, let us clarify: ACT (for Applied Computer Techniques) is headquartered in Birmingham, England, does its research and develop-

ment at Dudley in the Midlands, but manufactures computers in Scotland. So perhaps English would be a better term than British to use in describing ACT.

ACT is the distributor of the Victor 9000, a machine that has had a limited

The Apricot is not just another fruit.

impact on our shores, but has become quite popular in the U.K. and on the Continent as the Sirius 1.

The Apricot is not just another fruit. Its mass of features makes it a sure thing to put a dent in the jade U.S. market.

At \$3100, it sports a true 16-bit 8086 processor, clocked at 5MHz, and 256K standard RAM, expandable to a whopping 768K. It makes use of dual state-of-the-art Sony 3 $\frac{1}{2}$ " microfloppy drives. It runs MS-DOS 2.0, CP/M-86, and Concurrent CP/M-86.

Its keyboard is unmatched by any machine on the market today. It includes a ground-breaking 40-character two-line LCD display, which can define a row of special function keys below it, or be used independently. The keyboard also features a battery-powered internal clock/calendar, the contents of which read out on the LCD but can also be piped to the CPU under MS-DOS. On deck for the unit is an add-on internal autodial modem, and co-processor capability.

Now picture this: all of these features

creative computing

HARDWARE PROFILE

Name: ACT Apricot
Type: Transportable business system
CPU: 16-bit 8086 5MHz
RAM: 256K, expandable to 768K.
Keyboard: 96 keys, full-stroke, fully programmable
Text Resolution: 80 x 24
Graphics Resolution: 800 x 400 pixels.
Color/sound: Monochrome/TI 76489 sound chip, large built-in speaker.
Ports: RS-232 serial, Centronics parallel.

Dimensions: CPU 17" x 12" x 5";
CRT 11" x 10" x 9";

Keyboard: 16" x 7" x 2"

Documentation: Excellent. Five manuals.

Price: \$3100 with dual, single-density drives.

Summary: An innovative, high quality machine, setting a new standard in the "transportable" category. LCD microscreen capability is novel and useful.

Manufacturer:
ACT International
111 Hagley Rd.
Birmingham, B168LB England
021-454-8585



Chris Buckham of ACT, with the new baby.



IS THIS LEVEL OF RELIABILITY REALLY NECESSARY?

ACCUTRACK



If you've ever lost data due to a faulty disk, you know how important reliability can be.

That's why Accutrack disks are critically certified at 2-3 times the error threshold of your system. Why they're precision fabricated for higher signal quality, longer life and less head wear. And why we take such extra steps as testing single-density mini disks at double-density levels. So you don't have to worry about the reliability of your media.

Accutrack disks. OEMs have specified them for years. You can trust them for your data. Call toll-free (800) 225-8715 for your nearest dealer.



ACCUTRACK
Dennison KYBE Corporation

82 Calvary Street, Waltham, Mass. 02254
Tel. (617) 899-0012; Telex 94-0179
Outside Mass. call toll free (800) 225-8715
Offices & representatives worldwide

Dealers: Give your customers a choice—Accutrack's OEM performance as well as your heavily advertised brand. We have the industry's only complete line of disks, cassettes and mag cards, including virtually all special formats. If you want a quality line, small minimums, the ability to mix and match, private labeling, fast delivery and great price, call today. Find out how responsive a media supplier can be.

CIRCLE 121 ON READER SERVICE CARD

ACT Apricot, continued...

are packed into a case no bigger than an attache. Unpacked, the unit CPU case measures 17" x 12" x 5". Its CRT, with pedestal, measures in at 11" x 10" x 9", and when seated in place above the main box, brings the total height to only 15". The tapered, detachable keyboard, which clicks solidly into the bottom of the main case for transport, measures 16" x 7" x 2" at its widest points. Pull out the hidden handle, push down the handsome shutter that protects the



The Apricot in attache mode.

microdrives, and you're ready to shove off. The packed system weighs 17½ lbs. in one hand, with the CRT 9 lbs. in the other.

The Apricot is not labeled a portable but rather a "transportable," as the CRT for the unit is external, and you must be near a power socket (mains, as the British say) to use the computer. Still, you are getting a full-size display in the trade-off, and for our money it is much easier to carry a packed-up Apricot with CRT than to lug around a Kaypro or Compaq—and certainly more desirable.

Cosmetically, the Apricot is just about the best looking micro you are apt to see. At least two members of our art department stopped dead in their tracks when they saw the thing, and said "wow." The Apricot is a knockout. It looks exactly the way a next-generation microcomputer ought to look, and then some. Everything about it signals "quality." And its beauty is far more than skin deep, as you shall see.

The Keyboard

One look at the detached keyboard and you know you are on to something special. It has 96 fully programmable keys, and is laid out in the IBM-Selectric style. It includes dedicated HELP, UNDO, PRINT, MENU, and FINISH keys to make life easier although each and every key on the keyboard can be easily redefined. The CAPS LOCK and STOP keys are LED

illuminated to indicate their activation. There is a full numeric keypad and nearly directional cursor movement keys (see photo). The angle of the keyboard is not adjustable, but seems to be set at a very acceptable rake.

The "feel" of the keyboard is excellent. It has a tight but full-travel action and no bounce whatsoever. At first we felt the keyboard was a bit spongy, but we were pressing too hard. Upon letting up a bit, we realized the keyboard design accounts for all tastes. There is no feeling of having "hit bottom" during a keypress, so angry typists can vent their frustrations without spraining fingers. Hence the feeling of sponginess. At the same time, feather-touch typists will notice the keyboard response is fantastically swift. By the time the key has traveled a millimeter or so, the keypress has registered.

The autorepeat start time, repeat rate, and keyclick volume of the keyboard can be simply controlled through software. More about that up ahead.

Then there is the "microscreen." This is a two-line, 40-character LCD display on the upper righthand side of the keyboard. Upon power-up, it displays the date and time (see photo). It is also used to label six touch-sensitive function keys just below it. Each function key has its own LED, to indicate when it is activated. One very nice use of this feature is the ability to redefine these key labels throughout the levels of a program. The keys can change function without muss or fuss, and remain clearly labeled at all times. It takes more pressure to activate the touch-sensitive keys, but this is perhaps a desirable feature for the special function keys—they cannot be accidentally invoked.

Another feature of the microscreen is the calculator mode. Press the CALC key in the top row of permanently assigned function keys, and the LCD becomes a full-blown calculator with memory. You may perform all the operations you de-

One look at the detached keyboard and you know you are on to something special.

sire, then return to whatever spot you were in before you entered the calculator. You can even send the results to the current program. There is a percent key, too, which is very handy.

As on the TRS-80 Model 100, the angle of the LCD can be adjusted with a thumbwheel on the righthand side of the keyboard. This ensures that the display will be legible from any conceivable posture. Next to the thumbwheel is a recessed reset button. To prevent accidents, it must be held in the depressed position for one full second before the Apricot resets.

When the unit is on and the keyboard is plugged in, the LED dot on the "i" of the Apricot logo is illuminated—very stylish.

On the rear of the keyboard is a mysterious DB-9 jack, which will soon add mouse capability to the Apricot as well. With its LCD-defined function keys, the need for a mouse is questionable, but thoughtfully, ACT has put the capability there anyway. At press time, they had not finalized their approach to a pointer input peripheral.

The Disk Drives

When a company goes OEM for drives, it has to keep quality and availability in mind. To go OEM for a new technology, such as microdrives, the criteria become even more critical. For ACT, the decision was obvious: the Sony microdrive. Proven performance, proven reliability, and proven availability are hallmarks of the Sony name. The



The best keyboard we've ever seen or touched.



HOW TO UNSCRAMBLE YOUR NEST EGG.

It doesn't take a computer to tell you that money can't buy you happiness.

But at last there is a piece of personal computer software that will make you a lot happier about your money.

And you're looking at it.

Making sense of your dollars.

Dollars and Sense™ is designed to save you money by organizing your money. By giving you the clearest picture you've ever had of your financial behavior.

It can establish budgets along any lines you like. Monthly or annually, fixed or variable. On up to 120 accounts.

It can write checks, make transactions automatically. Even remind you to pay your bills.

And as time goes by, it tells you exactly how you're doing. With a complete set of reports and full-color

graphs* that come up on screen or print out on paper. At the touch of a key.

And all you have to do is spend a few minutes each week telling your IBM® PC, Apple® II or IIe what came in and what went out.

User friendly. Really.

Dollars and Sense also happens to be very easy to use. For everyone who uses it.

If you're a novice, at computing or accounting or both, don't worry.

The interactive demonstration disk will get you started. And the program will keep you going. With sample accounts, on-screen prompts and a user's manual that's written in plain English.

And one more thing. Dollars and Sense is tax-deductible.

But only if you use it on your taxes.



MONOGRAM™

8295 South La Cienega Blvd., Inglewood, CA 90301 213/215-0529

Apple is a registered trademark of Apple, Inc. IBM is a trademark of International Business Machines. *Color monitor required.

CIRCLE 174 ON READER SERVICE CARD

ACT Apricot, continued...

new Sony 3 $\frac{1}{2}$ " drives are a look at the future of disk storage. The drives supplied with the unit we tested in the lab were single-sided, limiting storage to a mere 315K per drive. On deck for the Apricot, are new double-sided drives, which will more than double this capacity, bringing the total disk storage capacity to well over 1Mb.

The Sony drives are a joy. They are noiseless but for a click when activated and are very, very fast. We watched full-blown hi-res screens load from disk in under five seconds. Spring-loaded metal shutters in the disks protect head access holes from wandering thumbprints, and as a recent innovation, are automatically opened and reclosed within the drive. The user need never (and should never) see the magnetic medium itself. There is no need for doors on the drives, and the disks themselves can take a great deal of abuse (see sidebar.)

Also in the on deck circle from ACT is a 3 $\frac{1}{2}$ " hard disk option, which will fit in place of drive B. If the 10Mb offered



Doorless microdrive.

The Great Micro-Floppy Case

Of particular interest is the Sony micro-floppy disk casing.

The rotating medium itself is very well protected, so that the diskette is much less prone to damage than 5 $\frac{1}{4}$ " or 8" floppies. The disk cover is made of rigid plastic which incorporates a

sliding aluminum cover to protect the head window when the diskette is not in use. The center hole is reinforced with a heavy duty aluminum hub.

While these improvements result in added cost to the disks, they totally eliminate the need for disk sleeves, and produce a much more durable diskette overall. Spills, bending, and cruel treatment during shipment pose a minimal threat to micro-floppy data.—JJA

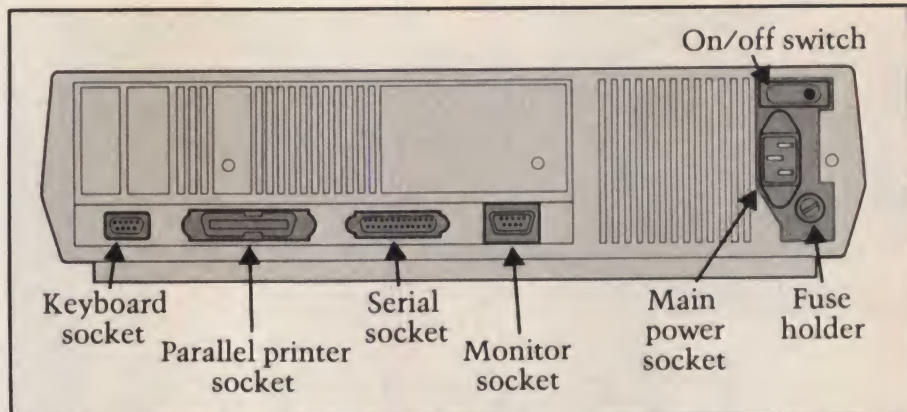
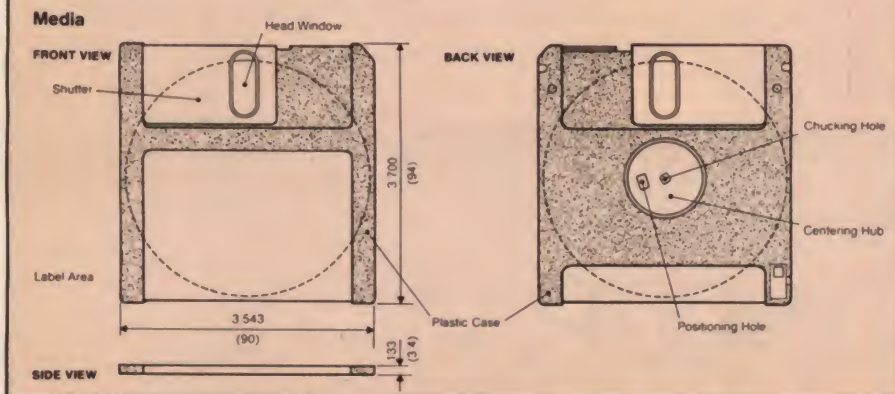


Figure 1. The rear end.

by this option is still not enough for you, you will have to look to external storage methods.

The CPU And Environs

The computer inside the main case of Apricot is on a single board, maximizing reliability and ease of service when it is needed. Built around the 8086 CPU, a separate 8089 input/output processor handles I/O operations to and from the drives and the asynchronous link. Room for an optional 8087 mathematics processor is also available on the board, although use of this add-on chip will require software written specially for it.

The 8086 CPU is a twin to the 8088, but has a true 16-bit bus, as opposed to the 8-bit data bus of the 8088, as found in the IBM PC. This speeds its benchmark, as shown up ahead. The advan-

tage of the 16-bit software approach has yet to surface, but we remain patient. If and when it does, the Apricot will exhibit it.

For the purpose of comparison, we ran the David H. Ahl Quickie Benchmark Test on the Apricot, as a measure of CPU speed and accuracy from Basic (for a full description of the test, see the November issue of *Creative Computing*). The Apricot scored in the top five machines tested as of this writing: the answer came back in 17.6 seconds, with an accuracy of 0.005859375, and a sum random of 7.18416. Like EPA mileage statistics, the benchmark should be taken with a grain of salt. Still, the Apricot outperformed many of its more-touted rivals. For example, the IBM PC took 24 seconds in the same test, returning an accuracy of only 0.01159668.

The Sony drives are a joy. They are noiseless but for a click when activated and are very, very fast.

Also on the CPU board are two expansion slots. Whether these are going to be enough for the serious user remains to be seen. One will be taken in nearly all cases by the modem card. The other will in all probability have to lead to an external expansion box, if the user desires the full 768K RAM and co-processor or IEEE-488 capability. Third party hardware manufacturers take note: the expansion slots are fully documented and just waiting for Apricot-compatible goodies.

At the rear of the unit are sockets for the power cable, keyboard, and monitor (see Figure 1). In addition there are a Centronics parallel printer port and an

The Ultimate Spreadsheet Display For Apple®

128 Columns by 32 Lines, 80 Columns by 48 Lines, and More!

UltraPlan™

SPREADSHEET CALCULATOR

**Software
For use with Apple**

- EASY TO FOLLOW MENUS
- VARIABLE COLUMN WIDTHS
- SHIELDS CONFIDENTIAL INFORMATION
- PREVENTS ACCIDENTAL CHANGES
- EASY CURSOR MOVEMENT

UltraPlan—an advanced spreadsheet program—makes planning, forecasting, and budgeting easy, fast, and accurate. UltraPlan can make full use of the UltraTerm, Videoterm, and can use additional memory cards for models as large as 512K. UltraPlan is compatible with VisiCalc® data files and features advanced commands not found in VisiCalc. UltraPlan is compatible with the Apple II and Apple IIe computers.



Actual photo of 128x32 screen.

UltraTerm™
A DISPLAY PERIPHERAL

To display more than 80 columns or 24 lines, you will need an UltraTerm video display card. This card gives your Apple II or Apple IIe the ability to display more characters than ever. Nine display modes that can display as many as 4096 characters allow you to choose the number of columns and rows best suited to your application.

UltraTerm utilizes 8 x 9 or 8 x 12 dot character matrix (versus the normal 5 x 7) to deliver superb resolution in the crispest, cleanest characters available anywhere.

Other display attributes such as highlight/lowlight, inverse, and half-intensity backgrounds can be chosen to suit your own viewing preferences.

Videoterm™

The Videoterm—the best selling 80 x 24 display card for the Apple II—can be used with UltraPlan. The advanced software features and expanded memory capability of UltraPlan are also available to Videoterm users.

Videx Inc.

897 NW Grant Ave. • Corvallis, Oregon 97330
(503) 758-0521

CIRCLE 178 ON READER SERVICE CARD

ACT Apricot, continued...

RS-232 serial port. The keyboard input uses a male DB-9 plug, while the monitor uses a female DB-9 socket, so there is no way to hook up incorrectly. The parallel port uses exactly the same jack as those found on Centronics parallel printers themselves—this is quickly becoming the de facto standard configuration. The RS-232 plug is the standard DB-25 male. These configurations make hooking up the Apricot to external devices as straightforward as possible.

The Display

The CRT for the Apricot is one of the sleekest we have ever seen. It tilts and swivels, and can be moved across the width of a shallow groove in the top of the main box. This allows the display to be positioned extremely flexibly.



CRT displays the Manager.

Although the display is only 9" measured diagonally, it provides crisp, clear, easy-to-read characters and very serviceable hi-res capability. It has a non-reflective green-screen coating, and a resolution of up to 800 x 400 pixels. The only necessary external control is a brightness knob.

As far as we are concerned, the CRT arrangement of the Apricot is much preferable to an internal monitor of smaller size, such as is found on the Kaypro. An indented handle makes carrying the CRT as convenient as possible, though in most cases it would probably be boxed for transport. Another possibility would be to have a CRT at each location the Apricot is to be used, such as at work and at home. Then the Apricot, sans CRT, would truly qualify as a portable.

The custom CRT plugs only into the Apricot, from which it receives not only a video signal but its power supply. This makes cabling a breeze, but pre-empts the possibility of hook-up to conventional, and less expensive, monitors. Extra Apricot CRTs cost about \$300 each.

Modus Operandi

The decision to supply fully three operating systems with the Apricot is another good example of ACT's savvy in

The CRT for the Apricot is one of the sleekest we have ever seen.

positioning its machine, and should not be overlooked when assessing the total cost of the system. The flexibility of the Apricot is unbeatable on this score: the user may choose CP/M-86, Concurrent CP/M-86, or MS-DOS 2.0 to operate the machine. Each system has its own advantages, and the ability to pick and choose between them allows the user to skirt the disadvantages of each.

Digital Research CP/M-86 is a fine operating system, proven over time and offering a vast array of software. Concurrent CP/M-86, also from Digital Research, enhances the versatility of plain old CP/M-86, and offers the capability of multi-tasking, wherein more than one program may be executed simultaneously.

Using Concurrent CP/M-86, you can create up to four "virtual consoles." These are channels that you can switch between, just like channels on a TV. You may perform word processing on channel 0, while running a spreadsheet on channel 1, a database on channel 2, and a telecommunications program on channel 3. Multi-tasking is necessarily memory intensive and, therefore, most powerful under the maximum RAM configuration.

In the buffered mode, characters generated within a running program are saved to a temporary disk file during switching between consoles. When you return to the original console, the saved file is re-established within it. In this manner you may let one program turn out pages of text while you work on another project, then return to see how the first program is doing whenever you like.

Concurrent CP/M-86 also supports passwords, user numbers, and file attributes, which are not supported by CP/M-86. Additionally, Apricot Concurrent supports date- and time-stamping of files from the internal clock/calendar, and several other commands which combine to make CP/M-86 more powerful and easier to use. There is even a windowing capability a la Lisa, but we must be careful about comparing Apples with Apricots.

Then there is MS-DOS 2.0, which offers some very provocative potentials. First off, and very importantly, it is fully compatible with MS-DOS as it appears on the IBM-PC: using the serial port

and telecommunications drivers on each end, programs can be downloaded directly from the PC. Then, using a supplied IBM emulator program, they can be run on the Apricot (let us pause to reflect that commission of such transmission might infringe on copyright laws). In the U.S. later this year we may see a 5¼" outboard add-on disk drive that reads IBM disks. We have stressed to ACT the advisability of such a peripheral, at least on this side of the Atlantic.

The Manager

But there is much more than IBM-compatibility to the advantage of Apricot MS-DOS as an operating system. Foremost of these is the Manager, a beautifully designed user interface program that makes working with the Apricot easy for even the utter novice. If you so desire, you need never face MS-DOS to use it—just use the Manager to get where you are going.

Upon power-up, the Apricot runs a self-test, the microscreen reads out date and time, and the CRT indicates readiness for insertion of a disk. When you insert the system master, the Manager module autoruns. It provides a handsome and easy-to-use menu of the programs available (see photo). The microscreen function keys will be activated, making selection of the desired program as simple as a single, clearly labeled keystroke. Alternatively, you can use the cursor keys to move through the menu, then hit the RETURN key when your choice is highlighted. And if you had a mouse, you could use it to choose your selection.

As you move the cursor horizontally through the five possible "ladders" of the menu, that bank of choices automatically appears on the microscreen, and the function keys automatically toggle to reflect the new set of choices. At the same time, a brief help note describing the nature of each program appears at the bottom of the main display as its name is highlighted.

If more detailed helps are needed, they are available all along the way. Help can be chosen from the lefthand ladder at any menu point along a decision-tree, or the HELP key itself can be pressed. In this way more information can be called up without (horrors!) reference to documentation.

Backing out of any selection along the trees and subtrees of the Manager returns you to the previous step. Although this can become tedious during complex operations, it ensures that you will never lose track of just where you are. The Manager has an index which can hold up to 29 programs plus the Tools program, which allows for easy execution of housekeeping chores.



Can you save the Doomed Dinosaurs and escape the Dino Mom's stomp?

Warped into a prehistoric world you've contaminated the dinosaurs. You must climb nine deadly cliffs, find the dino eggs and carry them back to the 21st century.

Dodge the radioactive snakes and spiders when you climb, leap and jump over the challenging cliffs to locate the eggs. As you fight your way up the nine levels your skills must increase if you are to survive the deadly creatures



Fire is the only weapon you have to keep the Dino Mom from putting her foot down and crushing YOU!

Can you escape the Dino Mom's stomp, avoid the crawling, clawing creatures, find the eggs and save the dinosaurs from extinction? Only you can face the challenges of survival in the prehistoric time warp of DINO EGGS™ from MicroFun, Inc. ...the fun goes on forever.

**Created by
David Schroeder**

micro fun™

...the fun goes on forever



Available for:
Apple II™ & IIe™
Atari 800™
IBM PC™
ColecoVision™
Commodore 64™

MicroFun™ and Dino Eggs™ are registered trademarks of MicroLab, Inc. Apple II & IIe, IBM PC, Atari 800, Commodore 64 and ColecoVision are registered trademarks of Apple Computer, Inc., IBM Corp., Atari, Inc., Commodore Electronics, Ltd., and Coleco Industries, Inc., respectively.

© 1983 MicroLab, Inc.

2699 Skokie Valley Road, Highland Park, IL 60035 312/433-7550

CIRCLE 190 ON READER SERVICE CARD

ACT Apricot, continued...

The programs you wish to hold in an index must be assigned using one of the utilities of the toolkit, along with a single sentence help description you provide. Adding, deleting, or changing the index of the Manager, is extremely simple, using the `OPTION` utility.

If an attempt is made to execute a program that is in the index but not on the same disk as the Manager a prompt asks you to insert the correct disk. Then press the spacebar, and if present, the desired program will load.

You may wish to bypass the Manager shell and interact directly with MS-DOS. Simply choose the `FINISH` option from the main menu, and the all-too-familiar `>A` prompt comes right up on the screen. Purists relax: the Manager in no way obscures MS-DOS from those who choose to access it directly. We can't imagine, however, even the most seasoned user rejecting the convenience of the Manager program for routine access to the powers of the Apricot.

You may wish to bypass the Manager shell and interact directly with MS-DOS.

Other Configurator utilities available from the Tool module or directly from MS-DOS are the following:

- **Disk**, which allows the setting up and erasure of directories and supported subdirectories; copying, renaming, verifying, and deletion of files, formatting and back-up of disks.
- **Alter**, which allows on-the-fly con-

figuration of the serial port, on-the-fly selection of serial and parallel output, and setting the date and time on the clock.

• **Tailor**, which allows for the editing and entry of foreign characters and special fonts, programming of the keyboard, entry of a custom logo to replace the "Apricot" banner on the upper right-hand side of the main display, and modification of the Manager.

• **Setup**, which allows keyclick and bell volume adjustment, keypress autorepeat and delay-rate adjustment, customization of LCD default display, and customization of system defaults.

• **Miscreen**, which allows the microscreen to be programmed.

• **Spooler**, which allows files to be queued to a printer while the Apricot moves on to another task.

Special fonts, logos, keyboard configurations, disk and overall system defaults may all be saved as disk files and retrieved when and where necessary. Most of the programs for creating these use ladder-based menus as does the Manager, and are quite painless to use. The font, logo, and keyboard editors, for example, are totally self-prompting, and make customization much easier than on any other system we have seen. Settings of keyclick and bell are aided by bargraphs graphing volume. Everywhere, it seems, care has been exercised to make Apricot housekeeping as easy as possible on the user.

This capability comes at a price, however. When MS-DOS is invoked on a 256K system, free RAM memory is chopped in half to 128K. A 48K chunk of RAM is, however, enclosed in the BIOS (Basic Input/Output Section) to hold special fonts, bit-mapped screen RAM, or even act as a file buffer—like a

The folks at ACT acknowledge that the choice of a word processor is an extremely personal one.

miniature RAM-disk. As programmers learn to use this feature, it will become more significant.

So don't hold your breath for Concurrent Apricot MS-DOS—we guess you would need 512K just to get off the ground with such an option. You are free to dream, however. And from what we have seen already, who knows *what* these folks are capable of.

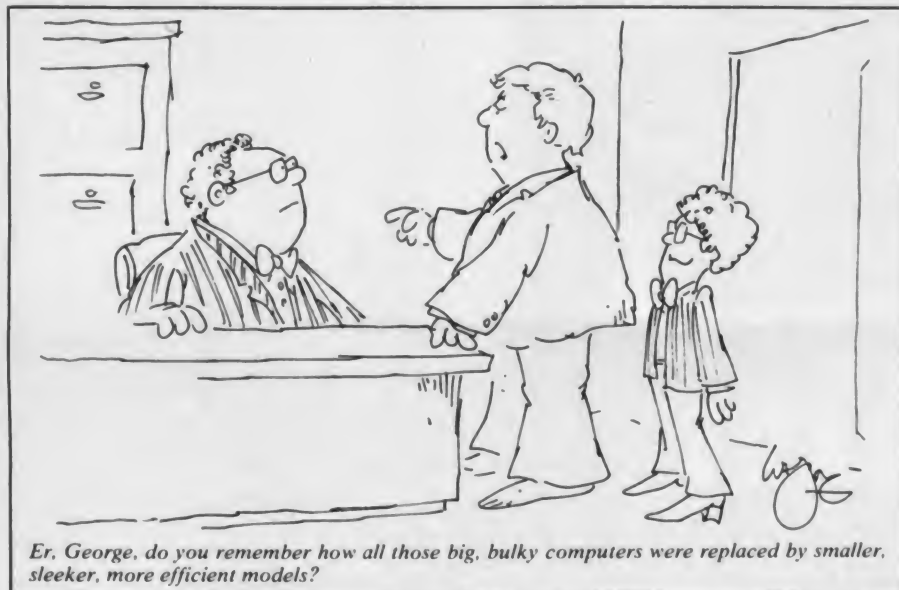
Bundled Software

For the base sticker price of the Apricot, these three operating systems might have been enough, but ACT has not stopped there. On the disks supplied with the unit (in a cute snap-pocket case), you also get the GSX Graphics System from Digital Research, which allows transportability of graphics standards across CP/M, Concurrent, and, believe it or not, MS-DOS. You get two versions of Basic, from Microsoft and Digital Research (the DR package, called Personal Basic, was not available at the time of this evaluation). You get *SuperCalc* and *SuperPlanner*, from Sorcim, which are the familiar spreadsheet package and a new address book/calendar planning package, respectively.


What, no word processor? Well, in a word, no. The folks at ACT acknowledge that the choice of a word processor is an extremely personal one and we agree. For that reason, no word processor is bundled with the Apricot. *WordStar* was supplied with our test unit and behaved perfectly well (though it is tough to use the word *perfect* so near the word *Wordstar*). We are sure that more choices will be available soon.

ACT has announced that it will be releasing a bevy of business software, initially from its Pulsar line, in Apricot microflop format. It has announced Fortran, Pascal, and a Macro86 assembler. We took a quick look at run-time Cobol, and like *WordStar*, it did run. What more can you say about Cobol?

Anyone with access to a Victor 9000 or Sirius computer should know that the Apricot is Sirius-compatible as well, via the asynchronous port. Software downloaded in this manner will run without any problem. The only ramifications to the process are legal, not technical.



Er, George, do you remember how all those big, bulky computers were replaced by smaller, sleeker, more efficient models?



OUR LIMES ARE HELPING THE WHITE HOUSE COMMUNICATE!

The Lime™ is a surge protector from EPD.

Surges are fluctuations on the powerline that can happen at any time, causing downtime, data loss and permanent damage to computers, software and all microprocessor controlled equipment.

Limes keep the White House Communications equipment safe from the dangers of power surges that could damage or destroy it without warning. Electronic protection devices, like The Lemon™, The Lime™, The Orange™, and The Peach™, are at work all across

the nation in places like the U.S. Justice Department, Chemical Bank of N.Y., Southwestern Bell, New England Telephone, Diebold Inc., Harvard University, and other leading organizations who know the value of expert protection.

Who's protecting your equipment from powerline problems?

Play it safe and go with the leader in surge protection that protects America's leaders. With EPD you're not only protected by the expert technology behind all of our products but by an insurance policy from a world renowned

insurance underwriter based in London, England which insures that protection.

With EPD you're in good company.

DON'T PLUG IN WITHOUT US.



Electronic Protection Devices Inc.
P.O. Box 673, Waltham, MA 02254
(617) 891-6602 • 1-800-343-1813

CIRCLE 163 ON READER SERVICE CARD

Your computer's telephone. Hayes™



What will counteract NDC
74-0054-60?



Gary: The pedigrees for next week's
auction are as follows...



Sold 1000 shares at 33 for net profit
of 6000. Richard.

Wouldn't it be great if you could use your IBM®PC to tap into vast resource libraries across the country? To transfer files to your partner, upstate? Or from your broker, down the street?

It's possible. All you need is a modem, to connect your computer to others. Down the hall. Or thousands of miles away.



Hayes Smartmodem. Think of it as your computer's telephone. Hayes Smartmodem 300™ and the faster Smartmodem 1200™ allow you to communicate over ordinary phone lines.

But any modem will send and receive data. Smartmodems also

dial, answer and disconnect calls. Automatically. And without going through the telephone receiver, making them far superior to acoustic coupler modems.

Choose your speed; choose your price. The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. For longer distance and larger volumes, Smartmodem 1200 operates at baud rates of 300 or 1200, with a built-in selector that automatically detects transmission speeds.

Both work with rotary dials, Touch-Tone® and key-set systems; connect to most time-sharing systems; and feature an audio speaker.

Smartmodem 1200B™ is also available as a plug-in board. Developed specifically for the PC, it comes packaged with Hayes' own communications software, Smartcom II.™

Smartcom II. We spent a lot of time developing it, so you can spend less time using it. Smartcom II prompts you in the

simple steps required to create, send, receive, display, list, name and re-name files. It even receives data completely unattended—especially helpful when you're sending work from home to the office, or vice versa.

If you need it, there's always "help." This feature explains prompts, messages, etc. to make communicating extra easy.

With Smartcom II, it is. Case in point: Before you communicate with another system, you need to "set up" your computer to match the way the remote system transmits data. With Smartcom II, you do this only once. After that, parameters for 25 different remote systems are stored in a directory on Smartcom II.

Calling or answering a system listed in the directory requires just a few quick keystrokes.

You can store lengthy log-on sequences the same way. Press

one key, and Smartcom II automatically connects you to a utility or information service.



Hayes®

Smartmodem 300, 1200 and 1200B are FCC approved in the U.S. and DOC approved in Canada. All require an IBM PC with minimum 96K bytes of memory; IBM DOS 1.10 or 1.00; one disk drive; and 80-column display.

Smartmodem 1200B. (Includes telephone cable. No serial card or separate power source is needed.)



Smartcom II communications software.

NOTE: Smartmodem 1200B may also be installed in the IBM Personal Computer XT or the Expansion Unit.

In those units, another board installed in the slot to the immediate right of the Smartmodem 1200B may not clear the modem; also, the brackets may not fit properly. If this occurs, the slot to the right of the modem should be left empty.

And, in addition to the IBM PC, Smartcom II is also available for the DEC Rainbow™ 100, Xerox 820-II™ and Kaypro II™ personal computers.

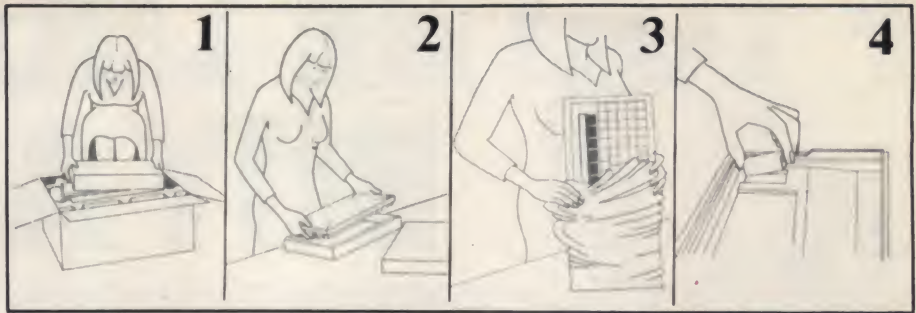
Backed by the experience and reputation of Hayes. A solid leader in the microcomputer industry. Hayes provides excellent documentation for all products. A limited two-year warranty on all hardware. And full support from us to your dealer.

So see him today. Break out of isolation. Get a telephone for your personal computer. From Hayes.

Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092. 404/441-1617.

Smartmodem 300. Smartmodem 1200. Smartmodem 1200B and Smartcom II are trademarks of Hayes Microcomputer Products, Inc. IBM is a registered trademark of International Business Machines Corp. Touch-Tone is a registered service mark of American Telephone and Telegraph. Rainbow is a trademark of Digital Equipment Corporation. Xerox 820-II is a trademark of Xerox Corporation. Kaypro II is a registered trademark of Non-Linear Systems, Inc. ©1983 Hayes Microcomputer Products, Inc.

ACT Apricot, continued...



Please keep your seatbelt fastened during unpacking.

The Documentation

The documentation accompanying the Apricot is superlative. It consists of five manuals: an Owner's Handbook, with general instructions and an introduction to the Manager; a Configurator Guide, documenting the many utility programs available; a CP/M and Concurrent User's guide; an MS-DOS User's Guide; and a *SuperCalc/SuperPlanner* manual.

The operating system manuals are based on the original documentation from Digital Research and Microsoft, and are quite readable. The MS-DOS guide is indexed, while the CP/M guide

family saloon? Not even in Dodge City, guys. Full stop.

One of the biggest kicks we got out of the documentation was the international unpacking instruction card. It is an oversized fold-out pictorial and has been drawn by the same person who draws the escape instructions for passenger airplanes. It breaks the Apricot unpacking procedure into 15 easy steps, not counting inflation of your life jacket. For all its amusement, it does provide a guide for the petrified. Next to having your machine unpacked by a stewardess, it is unparalleled in its helpfulness.

The Bottom Line

The Apricot was an open-and-shut case of love at first sight—and lasting, true love upon further inspection. From the outset, however, we felt it was a bit pricey. At \$3100, other options may beckon, clouding the issue. After thoroughly putting it through its paces, however, we changed our tune. The Apricot offers a great deal of value for the cost, considering the quality of its keyboard, drives, CRT, circuit design, and bundled software. It is truly a gem of a system.

Still, if it were to come down a thousand dollars or so, it might do more than just enchant us, and give us a good look at the future of the transportable market. It might just turn the whole U.S. micro market on its ear. We're keeping our fingers crossed.

The Apricot was an open-and-shut case of love at first sight—and lasting, true love upon further inspection.

is not. The owner's handbook is a very general introduction, designed to prime the user without intimidation for what is to come. It is nicely indexed and includes a very helpful glossary. The Configurator Guide is one of the most important pieces of documentation in the package, and is quite clear, though unindexed, and a bit terse at times. The *SuperCalc/SuperPlanner* manual we received had no documentation concerning *SuperPlanner*—just a page outlining the functional structure of the program, and indicating that "information about this product is currently under production." We trust this will be remedied by the time you read this.

In total, the job documenting this new machine has been exceptional. Though it is generally accepted that English English and American English are two different languages, the documentation has not been rewritten for its U.S. debut, and save for minor problems, it does not suffer for it. An example of the severity of the situation: "If you think of Basic as a 'family saloon' programming language, then C is a 'sports car' language." A



IF YOU'RE LIKE MOST BUY A SINGLE



YOU'LL BUY LOTS OF SPINNAKER GAMES.

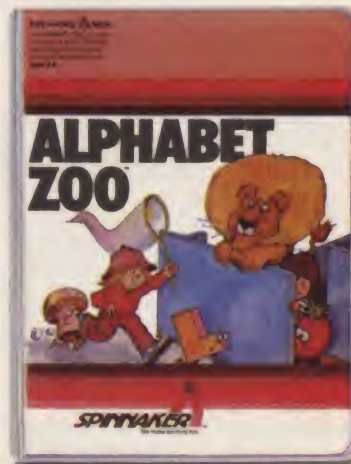
And not just because they're educational, but also because they happen to be a lot of fun to play.

In fact, they're so much fun, parents have been known to sneak in a few hours of play when the kids are asleep.

After all, if your kids are actually enjoying a learning game, there must be something to it. And there is: Fun, excitement and real educational value. That's what sets Spinnaker games apart from all the rest. And what brings parents back for more.

We offer a wide range of learning games for a wide range of age groups: 3 to 14. One look at these two pages will show you how we carefully designed our line of learning games to grow right along with your child.

So if you're looking for a line of learning games that are as much fun to play as they are to buy, consider Spinnaker Games. They're compatible with **Apple, Atari, IBM PC, PCjr, Commodore 64, Coleco Adam** and parents who don't mind their kids having fun while they learn.



A trip through ALPHABET ZOO.™ Ages 3 to 8.

It's a race. It's a chase. It's Alphabet Zoo, a game that sends your kids zipping through the maze, after letters that fit the picture on the screen.

Your kids will have fun learning the relationship of letters and sounds, and sharpening their spelling skills. They'll be laughing at every turn.

It's new! KIDWRITER™ lets kids make their own storybook. Ages 6 to 10.

KIDWRITER gives children a unique new format for creating their own stories. With KIDWRITER, kids make colorful scenes, then add their own story lines. It's as versatile and exciting as your child's imagination!

Best of all, while it encourages children to create word and picture stories, it also introduces them to the fundamentals of word processing. KIDWRITER will bring out the storyteller in your children—and in you!



PARENTS, YOU WON'T SPINNAKER GAME.



FRACTION FEVER™ brings fractions into play.
Ages 7 to Adult.

FRACTION FEVER is a fast-paced arcade game that challenges a child's understanding of fractions. As kids race across the screen in search of the assigned fraction, they're actually learning what a fraction is and about relationships between fractions.

All in all, FRACTION FEVER encourages kids to learn as much as they can about fractions—just for the fun of it!



DELTA DRAWING™ Have fun creating pictures and computer programs.
Ages 4 to Adult.

Kids love to draw. And DELTA DRAWING Learning Program lets them enjoy creative drawing and coloring while they learn computer programming concepts.

With DELTA DRAWING, even kids who have never used a computer before can learn to write programs and build an understanding of procedural thinking. It's easy, clear, and lots of fun!



FACEMAKER™ makes faces fun.
Ages 3 to 8.

FACEMAKER lets children create their own funny faces on the screen, then make them do all kinds of neat things: wink, smile, wiggle their ears, and more.

Plus, FACEMAKER helps familiarize children with such computer fundamentals as menus, cursors, simple programs, and graphics. FACEMAKER won't make parents frown because their children will have fun making friends with the computer.



SPINNAKER™
We make learning fun.

Disks for: Apple, Atari, IBM PC and PCjr, Commodore 64.
Cartridges for: Atari, IBM PCjr, Commodore 64, Coleco Adam.

An IBM compatible system with plenty of power, flexibility, and a useful selection of bundled software.

Eagle PC-2

creative
computing
equipment
evaluation



The Eagle PC-2 consists of a detachable keyboard, systems unit with two low-profile disk drives, monochrome monitor, software and documentation.

The Eagle PC is a versatile and powerful small business computer system. As its name implies, it is an IBM PC compatible system, but it is much more. Bundled with it are MS-DOS and CP/M-86 as well as word processing and spreadsheet software.

The Eagle PC is available in four configurations ranging from a 64K unbundled system to a top-of-the-line version with a 10Mb hard disk. We tested the PC-2, the configuration we judge will be the choice of most users. It has 128K of RAM, two floppy disk drives, monochrome monitor, MS-DOS, CP/M-86, EagleWriter, and EagleCalc. List price is \$3495.

Physically, the system consists of a system unit with low profile floppy disk drives, detachable keyboard, and monitor. The documentation and software are contained in one three-inch thick, three-ring binder. The hardware components are finished in a handsome light and dark gray color scheme.

Setup and installation are straightforward and simple. The coiled cable on the keyboard plugs into the back of the system unit. The power cord and video

David H. Ahl

cable from the monitor also plug into the system unit, and that's it. When it is not in use, the keyboard slides into a keyboard encasement under the system unit, thus giving it a space-saving footprint.

Detachable Keyboard

The keyboard is a sculpted unit which attaches to the system unit with a coiled cable which has a reach of four feet. Thus it is suitable for desktop or lap operation.

The keyboard contains 105 full-stroke keys. The standard alphanumeric keys and numeric keypad are white; the remaining keys are dark gray.

The keys are arranged in a more-or-less standard pattern—certainly more standard than the IBM PC. A nice touch is the separate shift lock (acts like a standard typewriter) and alpha lock (shifts only letters—very handy for word processing).

Special keys include the expected ESCAPE, CONTROL, ALT, INSERT, DELETE,

creative computing HARDWARE PROFILE

Product: Eagle PC-2

Type: Small business computer

CPU: 16-bit 8088

Ram: 128K, 512K maximum

Keyboard: Detached, 105 keys

Text resolution: 25 lines x 80 characters

Graphics resolution: 320 x 200 pixels with optional color board

Ports: Two RS-232 serial, Centronics parallel

Disk drives: Two double sided, double density, 5 1/4" drives, 320K each

Software: MS-DOS, CP/M, EagleCalc, EagleWriter included

Documentation: User's guide, and manuals for each software package

Price: Bundled system \$3495

Summary: An IBM compatible system with many extras and excellent bundled software.

Manufacturer:

Eagle Computer
983 University Ave.
Los Gatos, CA 95030
(408) 395-5005

SUCCESS STARTS HERE



game home and watch your child play, you'll know the excitement of a winning choice.

Active Family

Your family and CAI's growing family of animated, full-color programs have a lot to share—beginning with a willingness to reach beyond the ordinary to achieve the best.

At Your Command

You may meet a princess, a juggler or a dragon in *Wizard of Words*.™ You may appear as a guest on TV in *Master Match*,™ *The Game Show*™ or *Tic Tac Show*.™ Or, you may extend these programs still further with our *LearningWare*™ diskettes, offering hundreds of questions matched to the teaching strategies in the games. In every case, CAI puts a world of imagination and learning at your fingertips. And puts you and your child in control.

Unique Approach

Key features place CAI thinking tools in a class by themselves: Each program comes with its own *library of subjects*. But that's just the start. Our unique *authoring system* let's you or your child create your own lessons on any topic, tailoring the program to your family's needs—and no computer knowledge is required. Add the fact that we've kept the vital ingredient—*FUN*—in learning, and our *proven success* is no surprise. Over 2,000 school districts now use CAI programs to teach essential vocabulary and logic skills in a variety of subject areas.

CAI supports its products—and you—with an unconditional guarantee and a free backup disk. And provides compatibility with the most popular computers: Apple,® IBM® (and soon Commodore™).

Wise Choice

CAI is a group of experienced educators and programmers who believe that success begins with opportunities you create at home. Ask to see a demonstration of CAI programs at your local computer store, and see for yourself just how rewarding a good education can be.

**Computer
Advanced
Ideas**

Bringing Ideas Home

CAI™

1442A Walnut Street, Suite 341
Berkeley, CA 94709 (415) 526-9100

Apple is a registered trademark of Apple Computers, Inc. IBM is a registered trademark of IBM Corp. Commodore is a trademark of Commodore Business Machines, Inc.

CIRCLE 130 ON READER SERVICE CARD



The keyboard has 105 full-stroke keys. The top and bottom rows contain 24 programmable function keys.

BREAK, and HOME. In addition, there are keys marked ENHANCE and HELP (implemented in some software packages), four cursor control keys (arranged in a logical pattern), and 24 programmable function keys. Unfortunately, the left cursor and backspace key are one and the same, i.e., it is a destructive left cursor. We prefer separate keys.

However, 24 function keys are far more than are found on most computers. Many of these are defined in the various applications software packages, while others may be defined by the user.

Function keys F1 to F14 have labels marked on the keys. These are the correct designations for Eagle software packages (EagleWriter and EagleCalc), but do not correspond to IBM PC functions. The GWBasic software package contains a program, IBMKEYS, that redefines the keys to duplicate those on an IBM PC.

The keyboard has an excellent feel and keybounce is nonexistent. All keys repeat after being held down for about one second. There is no audible keyclick on repeated characters, so you must watch the screen to get the desired number of repeats.

System Unit and Disk Drives

The system unit houses the cpu, memory, I/O circuitry, disk drives, and expansion slots. The mpu employed is a 16-bit 8088 running at 4.7 MHz. Its performance on our benchmark was about as expected falling between the TI Professional and the IBM PC (see Table 1).

The PC-2 has 128K of RAM, expandable to 512K. With the exception of a bootup procedure, nothing is contained in ROM, hence, applications software packages tend to eat up large chunks of memory. With GWBasic, for example, user memory is restricted to 51,674 bytes; with EagleCalc, you get 39K. This, of course, is no different from other machines in this category, but quite different from low end and notebook computers which have Basic and sometimes other software contained in ROM.

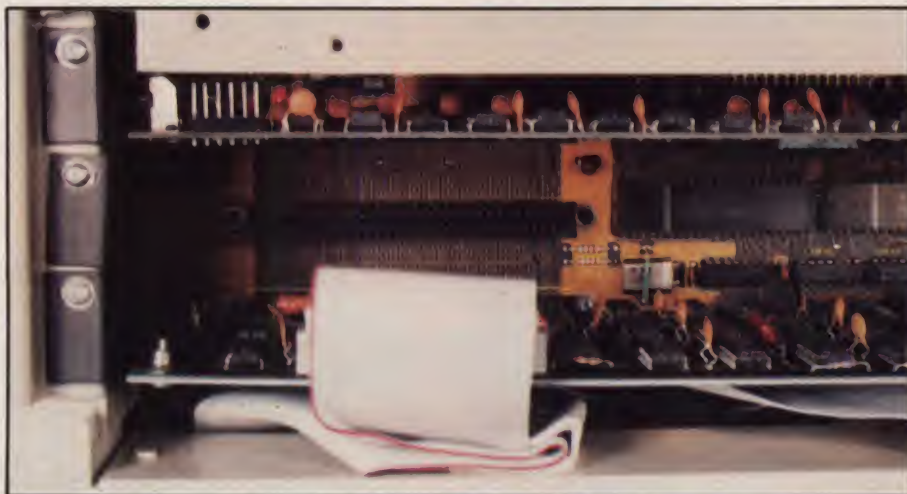
Two low profile, double-sided, double-density floppy disk drives each with a capacity of 320K are built into the PC-2. We like the quarter-rotation handles which raise and lower the drive spindles and hold the disk in the drive; we find them more reliable than the flimsy doors on the IBM PC (and many other computers). In operation, the drives are exceptionally quiet.

Indeed, the system itself is noiseless (no noisy fan like the TI Professional, although we understand that TI dealers will replace the airplane turbine in earlier units with a new, quiet fan). To see if overheating might be a problem, we operated the Eagle in a room heated to 90 degrees and left it running for 24 hours with no ill effects. After 24 hours, the system unit was quite warm, but it still was executing our program flawlessly.

The PC-2 system unit has connectors for the keyboard, monitor (D-9 jack for Eagle monitor and RCA jack for others),

Computer	Time	Accuracy (Lower is better)
TI Professional	0:15	.005859375
Eagle PC-2	0:19	.005859375
IBM PC	0:24	.01159668

Table 1. Benchmark comparisons.



Area for plug in boards in PC-2 is crowded with two boards; there is room for one more.

two RS-232 serial devices, and a parallel printer. The printer output is to a female Centronics-type connector, the same as on most printers. We had some difficulty locating a cable with a male Centronics connector on both ends, but as this convention is employed by more computer manufacturers (Epson, Fujitsu, etc.), we expect cables to be more readily available.

The system unit also has three slots for IBM-type add-on boards. In the PC-2, two of these slots are already occupied, so only one is truly available.

Output Display

The PC-1 and PC-2 configurations both include a 12" green monochrome monitor. We like the power cord that plugs into the system unit allowing the entire system to be turned off and on with just one switch. Text resolution is 80 characters by 25 lines. Characters are

The built-in character set is quite rich.

formed within an 11 x 14 pixel matrix and are very legible.

The specifications for the monitor state that it has 720 x 352 pixel graphics resolution. However, this is moot, as graphics are not supported by the monochrome video board. The only graphics possible on the monochrome monitor are those formed with the 50 graphics characters and the LOCATE command in Basic.

The built-in character set is quite rich and provides 222 printing characters; these are, of course, the same ones found on the IBM PC. They include the

Flight Simulator II

For Apple,
Atari, & Commodore 64™



Put yourself in the pilot's seat of a Piper 181 Cherokee Archer for an awe-inspiring flight over realistic scenery from New York to Los Angeles. High speed color-filled 3D graphics will give you a beautiful panoramic view as you practice takeoffs, landings, and aerobatics. Complete documentation will get you airborne quickly even if you've never flown before. When you think you're ready, you can play the World War I Ace aerial battle game. Flight Simulator II features include ■ animated color 3D graphics ■ day, dusk, and night flying modes ■ over 80 airports in four scenery areas: New York, Chicago, Los Angeles, Seattle, with additional scenery areas available ■ user-variable weather, from clear blue skies to grey cloudy conditions ■ complete flight instrumentation ■ VOR, ILS, ADF, and DME radio equipped ■ navigation facilities and course plotting ■ World War I Ace aerial battle game ■ complete information manual and flight handbook.

See your dealer . . .

or write or call for more information. For direct orders please add \$1.50 for shipping and specify UPS or first class mail delivery. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800/637-4983

CIRCLE 234 ON READER SERVICE CARD

subLOGIC
Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995



Screen photo shows character set of 222 printing characters.

expected ASCII letters, numbers and symbols, 50 graphics characters, 37 foreign letters, 17 Greek letters, math symbols, and several other strange characters.

A medium-resolution color board (320 x 200 pixels) is available for use with any good quality RGB color monitor. This board allows the use of the graphics commands in GWBasic as well as the running of machine language programs that employ color graphics.

EagleCalc

EagleCalc is an exceptionally versatile spreadsheet package. In the default mode, EagleCalc displays eight 8-character columns and 20 rows. Three lines at the bottom of the screen show remaining memory, cursor coordinates and contents of current field, command prompts, help prompts, and the current line being entered.

The spreadsheet has maximum dimensions of 64 columns by 255 rows. Of course, with only 39K available, you will not be able to build a 64 by 255 spreadsheet; a matrix of about 4000 cells is about the largest possible unless you add more memory.

Individual column widths can be varied to accommodate various labels. However, we did not like the mandatory one-column blank between cells. This prohibits the use of long titles that carry across several columns on the top of a spreadsheet.

A wonderful feature of EagleCalc is the built-in help mode. When you hit the

HELP key, a tutorial replaces the spreadsheet on the screen. In total, there are eight screens of material that practically comprise a condensed manual on EagleCalc.

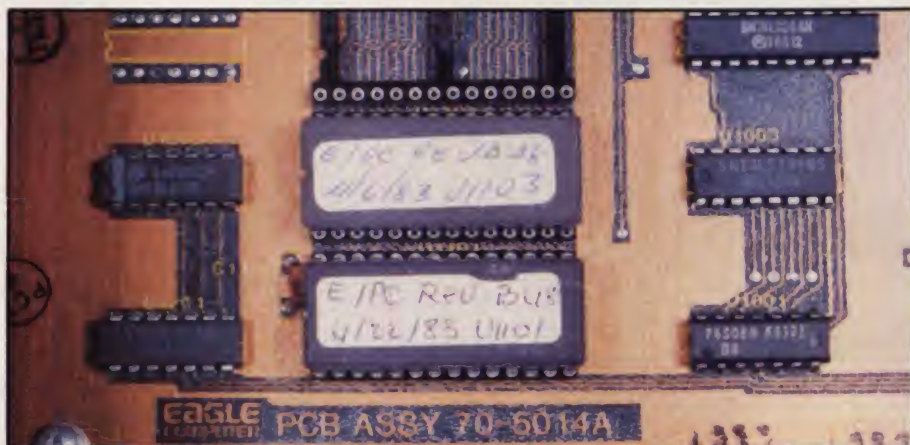
EagleCalc has all the expected spreadsheet functions including NPV (net present value), AVG (average), IF (Boolean test), and LOOKUP (searches for a value within a range of cells).

Eight function keys are implemented in EagleCalc for such operations as displaying the directory of files, loading and saving files, printing, formatting, and clearing.

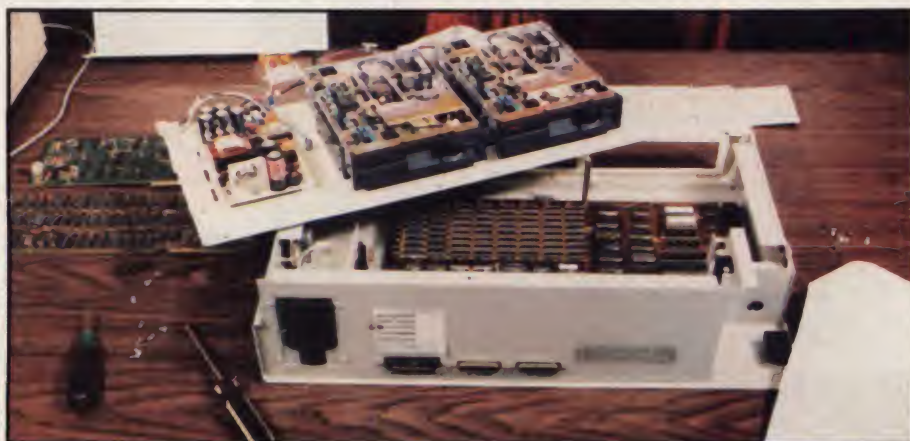
The 80-page EagleCalc manual is easy to understand. This, coupled with two sample programs on the master disk, should make learning the system a breeze for the first-time user. In most cases, the commands are identical with *VisiCalc*, so many of the books and routines written for *VisiCalc* should be usable with EagleCalc as well.

EagleWriter

Like EagleCalc, the EagleWriter disk boots up with a menu that allows selection of EagleWriter, disk backup, assign-



Our PC-2 was an early model so we had to install an updated EPROM (rev.C) to give it greater compatibility with the IBM PC.



Installing the EPROM required us to follow a long 24-step procedure for disassembly, installation, and reassembly.

DATA MANAGEMENT SOFTWARE TAKES OFF



It's not just a data base. It's data management. It's a big idea, and once you see how powerful it can make your personal computer you'll know why Condor Data Management software is the right idea at the right time.

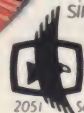
With Condor you get all the power and flexibility of a fully relational database, plus a Report Writer to generate reports. At no extra charge.

And it's simple to use. You can set up data fields quickly without the need for programming experience. Because Condor 1 and Condor 3 were written for business people with business needs.

Begin with Condor 1, the advanced file manager. Upgrade later as your business and your data grows, to Condor 3, the fully relational data management system. It's the same system that hardware manufacturers like DEC, Sony, Zenith, and Hewlett-Packard have selected to market with their personal computers.

To find out how Condor Data Management software can make your business take off, see your personal computer dealer, or call 1-800-854-7100 x165 (in California, 1-800-422-4241 x165) for the dealer nearest you.

He'll prove our point. That Condor is the data management software powerful enough to be useful to business, yet simple enough for business to use.



condor

2051 South State St., Ann Arbor, MI 48104 313/769-3988

CIRCLE 246 ON READER SERVICE CARD

Eagle PC-2, continued...

ment of system parameters, or entry of time and date.

In general, you will go directly to the program, however, you will have to assign system parameters at least once for the type of printer you have connected. This is a longish 23-step procedure, but it is well documented in the User's Guide. EagleWriter recognizes four major types of printers:

- Non-precision printers
- Diablo 1610, NEC 5515
- Qume Sprint 5, C.Itoh, Diablo 630
- NEC 5510

If you have another type of printer, you must select the option that most closely resembles it. User configuration is not possible.

A review of EagleWriter could be a feature review in itself, so we will present just some of the highlights.

EagleWriter normally operates in an overstrike mode, although the INS (insert) key will open up space from the cursor to the bottom of the screen for the insertion of letters, words, or entire paragraphs. Thus, in some sense, EagleWriter can be operated in overstrike or insert mode, whichever you prefer. Reformatting a line or page is carried out practically instantaneously—a pleasant change from some other word processing programs.

EagleWriter has two operating modes: edit and command. Edit mode is used for most functions (creating and editing documents, saving and reading files, and printing), while command mode is used only for saving and reading portions of files.

EagleWriter has three kinds of hyphens: hard (always in the same place), firm (in words at the end of the line), and soft (in words at the end of a page). You can tell EagleWriter how you want to treat both firm and soft hyphens.

EagleWriter has character, word, and line deletion. Insertion can be done by typing items to be inserted or by using the "cut and paste" (block move) facility.

There is a search and replace facility which can be used in a discretionary or automatic way. In fact, search and replace can even include files on the disk if you wish. Searching is exceptionally powerful and can be exact, literal, or make use of wildcards in several ways.

Output formatting and printing have a wide range of possibilities and offer as much flexibility as we have seen on any word processing package.

Thirteen function keys are implemented in EagleWriter, and many of the other special keys (HELP, DELETE, etc.) are also used. Since all of these keys are labeled, no special overlays or keypad labels are necessary.

EagleWriter comes with a thick, 211-

page manual which looks a bit forbidding, but, with its extensive illustrations and sample documents on disk, is quite comprehensible.

GWBasic

Microsoft GWBasic is a \$245 option with the Eagle PC. This is the standard 8088 Basic interpreter that runs under MS-DOS. It has all the bells and whistles with the exception of the graphics commands which require the optional color board.

According to the documentation, the disk comes with a User's Guide, Basic Reference Manual and Basic Reference Book. We're not sure of the difference between these latter two documents as we got an early version which included only one 102-page manual titled, "Language Feature Extensions to Standard Basic-86 Version 5.0." As we remarked in our review of the Computer Devices

All you do is pop in an IBM PC disk, power up the Eagle, and you are off and running.

DOT, this is a poorly organized manual that suffers from the lack of a table of contents and an index. We presume that production shipments will include the specified documentation.

IBM PC Compatibility

Although the Eagle PC is promoted and sold as an IBM PC compatible computer, nowhere in the documentation does it mention how to run IBM PC software. As it turns out, perhaps it is not necessary.

All you do is pop in an IBM PC disk, power up the Eagle, and you are off and running. It is that easy!

Of course, not every PC disk will run. We tried to run the disk from *PC Disk Magazine*. No go, except for one program. We quickly traced the reason to the fact that we did not have Basic on the Eagle. Once we loaded GWBasic we had no further problems. Naturally, you will not be able to run color graphics programs or games if you do not have the color board and a color monitor, but that should not be any surprise.

We were pleased with this compatibility, but just a teensy bit of documentation would have been nice. Eagle dealers have a booklet, "Eagle Compatible Product Catalog," that lists the IBM and third party hardware and software that works on the Eagle. Unfortunately, this is not available to end users.

Documentation

As mentioned earlier, all the manuals for the Eagle PC are contained in one large three-ring binder. The manuals include a 78-page User's Guide, manuals on EagleCalc and EagleWriter, a 50-page MS-DOS User's Guide, a 34-page CP/M-86 User's Guide, a glossary of terms, and a short section with customer support and warranty information.

All the manuals are written specifically for the Eagle PC, a pleasant change from the mildly customized applications software manuals furnished with so many other machines. Illustrations are included where necessary, and we found all the manuals to be clear and thorough.

Warranty and Support

The Eagle PC comes with the usual 90-day limited warranty on parts and labor, plus a one-year warranty on parts only.

Service on the hardware is available from either the selling dealer, Bell & Howell (a third party maintenance organization with 175 service locations), or directly from Eagle in Los Gatos.

Software support is also available from your local dealer, from regional distributors, or directly from the Eagle Customer Service Organization. You can hope you don't need to use this last option. We tried calling the distributor that shipped us the computer and they gave us a toll-free number to call at Eagle. It produced only a recorded announcement that it was inoperative.

We then called long distance—several times—and left messages. Finally, one was returned by a charming young lady who asked if we really had a problem. We said, "Yes, why do you think we



Our Products Get Used...Everywhere



In Business . . .

Toshiba	ITT
Sony	Boeing
General Electric	Lockheed
Union Carbide	Xerox
ARCO	TRW
Hazeltine	Raytheon
Westinghouse	Sorcim
Harris	Quantum
Grumman	Intel
McDonnell Douglas	Sperry Univac
Chase Manhattan	SofTech
Honeywell	E.I. DuPont
Polaroid	IBM
Magnavox	Hughes Aircraft

In Government . .

NASA
 Argonne Labs
 Jet Propulsion Labs
 U.S. Army
 U.S. Air Force
 U.S. Navy
 Naval Postgraduate School
 U.S. Department of Commerce
 U.S. Department of Treasury
 Social Security Administration
 FAA
 Depart. of Energy, Canada
 Depart. of Transportation, Canada
 Depart. of Publications, Australia

In Education . . .

Harvard University
 Georgetown University
 University of Chicago
 California Institute of Technology
 John Hopkins University
 University of Southern California
 University of Massachusetts
 University of Wisconsin
 U.S. Naval Academy
 Rochester Institute of Technology
 University of Iceland
 University of Leicester
 University of Trondheim
 University of Zimbabwe

THE MOST COST EFFECTIVE ADA* DEVELOPMENT TOOLS AVAILABLE ON MICROCOMPUTERS!

Our Ada product line is available on the following Operating Systems:
 CP/M, CP/M-86, PC-DOS and MS-DOS.

Available from the following distributors:

Nationally

Suntex Data
 10175 Harwin Suite 100
 Houston, TX 77036
 (713) 271-9191

CompuView Products
 1955 Pauline Blvd., Suite 200
 Ann Arbor, MI 48103
 (313) 996-1299

Westco, Inc.
 25 Van Zant St.
 Norwalk, CT 06855
 (203) 853-6880

Marfam Corporation
 5340 Thornwood Dr. Suite 102
 San Jose, CA 95123
 (408) 226-0170

Internationally

Nord-Micro Informatique
 155, rue du Fauburg
 Denis
 75010 Paris
 (1)205-39-47

Micronix
 11 Blackmore St.
 Windsor 4030
 QLD, Australia
 (07)57 9152

S-100 Systems
 3687-4 Shobumachi
 Obayashi
 Saitama, Japan 346-01
 04808 (5)0416:
 04808 (5)6565

CP/M, CP/M-86, CCP, M-86 are trademarks of Digital Research, Inc.
 *ADA is a trademark of the U.S. Department of Defense
 MS-DOS is a trademark of Microsoft

©Copyright 1983 RR Software



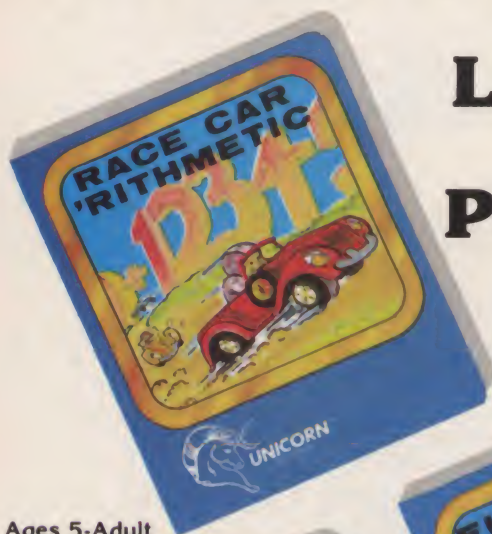
SOFTWARE, INC.

P.O. Box 1512 Madison, Wisconsin 53701
 (608) 244-6436

specialists in state of the art programming

CIRCLE 187 ON READER SERVICE CARD

UNICORN TREASURES MAKE LEARNING A PLEASURE™



Ages 5-Adult
(1 to 4 players)



Ages
2-7



Available on three levels
• Elementary (grades 1-6)
• Intermediate (junior high school)
• College Prep (high school-adult)



Ages
5-13

Each Unicorn educational game teaches as it entertains. All of our treasures have been developed at The Computer Learning Center for Children. Written by educational experts who make them fun, our games feature colorful, high resolution graphics, multiple difficulty levels, beautiful music, and are completely user friendly with simple on-screen instructions. You'll be delighted to use them year after year as your child's educational needs change.

Look for our growing line of quality educational games. You won't know what you're missing until you've seen a Unicorn.

Available at your local dealer or call or write Unicorn for our free brochure

Available for Apple,
Atari, Commodore 64 and
IBM-PC Computers.
Disk versions only.

UNICORN SOFTWARE™
1775 East Tropicana Avenue #8
Las Vegas, Nevada 89109
(702) 798-2727 or
(702) 798-5990



Apple, Atari, Commodore 64 and IBM-PC are trademarks of Apple Computer Corp., Atari Inc., Commodore Electronics LTD and International Business Machines Corp. respectively.

Copyright 1983 by Unicorn Software Company. All rights reserved

CIRCLE 248 ON READER SERVICE CARD

Eagle PC-2, continued...

called?" She said, "Okay, then I'll have a customer service person call you back." None ever did.

When testing a computer, we like to act as a normal customer, but after a month we gave up, revealed our true identity, and got some fast response to our problems.

We understand that things have improved today, so we tried the customer service line just before putting the finishing touches on this article and were rewarded with a return call in about two hours. We judge that quite acceptable.

Pricing

As mentioned above, the Eagle PC-2 with 128K, two disk drives, monochrome monitor, EagleWriter, EagleCalc, MS-

The Eagle PC is a well-designed computer with plenty of power and good versatility in a space-efficient package.

DOS, and CP/M lists for \$3495. Here are the prices of several add-ons and options:

64K Memory Kit	\$ 135
8087 co-processor	495
10M Hard disk unit	2495
Color board	295
GWBasic	245

In Summary

The Eagle PC is a well-designed computer with plenty of power and good versatility in a space-efficient package. The keyboard uses a standard layout, has a numeric keypad, and an unexpected 24 function keys. The disk drives are very quiet and, when the drives are not in operation, the system is totally noiseless.

We think that the monochrome board and monitor should permit the use of graphics, and we had a few small bones to pick with the documentation. Our experience with the customer support group wasn't wonderful, but that seems to have been rectified. All in all, these are small nits against a machine that is excellent in nearly every regard.

Considering the IBM compatibility, bundled software including both MS-DOS and CP/M-86, expansion slots; and compact design, we find ourselves in agreement with Eagle when they say, "The Eagle PC is simply, a better PC." It sure is.

CIRCLE 402 ON READER SERVICE CARD

February 1984 © Creative Computing

Last Year Over 20,000 Americans Were Committed To Asylum.



Once people enter *Asylum*[™], they don't *want* to leave. And neither will you.

Inside this thrilling adventure game from Screenplay[™] challenges lie around every corner, behind every door. There are hundreds of doors, too!

You've gone crazy from playing too many adventure games. You've been placed in the asylum to act out your delusions. To cure yourself, you must make good your escape.

There's no one you can turn to for help. Almost every turn leads to a dead end. Or worse, vigilant guards stand in your way. If you can't outmuscle them, can you outthink them? Inmates line hallways offering help.

Asylum runs in 48K on the Atari, Commodore 64 and IBM PC computers. See your local software dealer. \$29.95.

But can they be trusted?

While getting out of the asylum may take months, you'll get into our game instantly.

Smooth scrolling three dimensional graphics give you a very eerie sense of reality. This feeling is also heightened by the use of

full sentence commands.

No wonder thousands of people bought *Asylum*[™] last year, and *PC World* recently named *Asylum*[™] one of the top ten games for the IBM PC.

Play *Asylum*[™]. All you have to be committed to is fun.

screenplay[™]



Box 3558, Chapel Hill NC 27514 800-334-5470

You could win \$10,000 from Screenplay anywhere our games are sold.

CIRCLE 220 ON READER SERVICE CARD

Challenge yo

Make beautiful music. Everyone loves music. And anyone who has ever hummed a tune can write one, now. Scarborough has taken the universal language of music and developed a software program that makes it fun and easy to write songs for budding composers of any age.

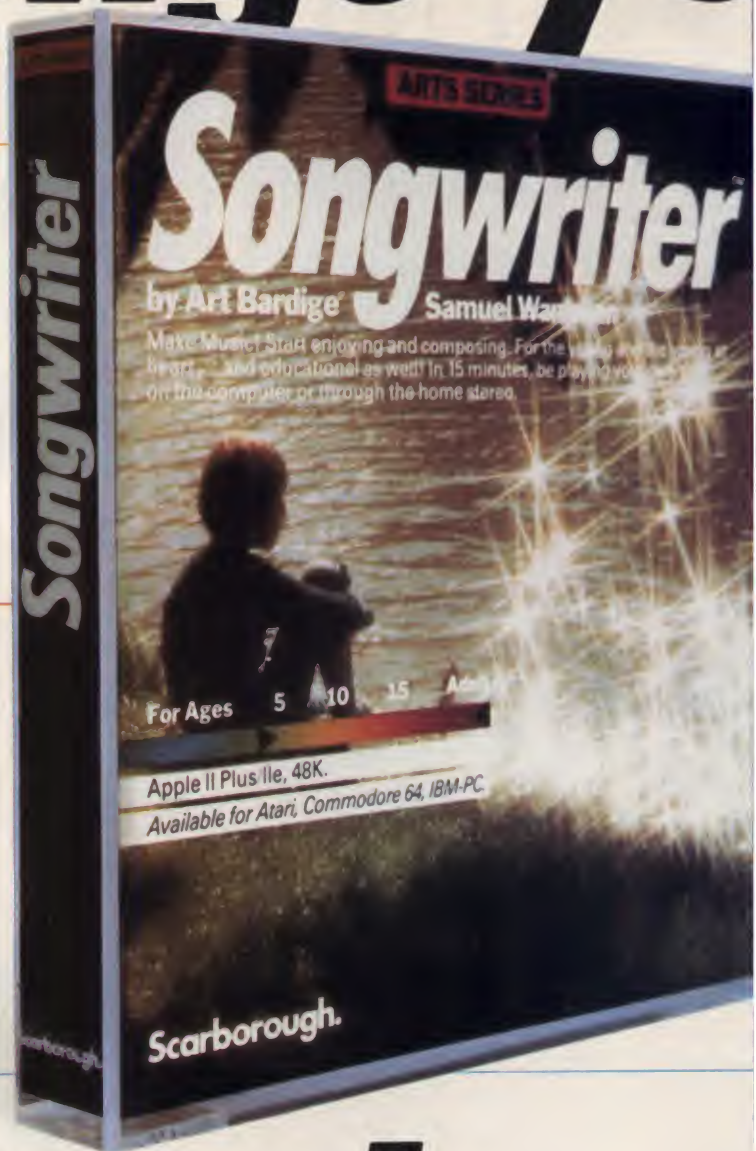
Even those who don't recognize a single note can be composing songs in 15 minutes. Simulated piano roll graphics and on-screen commands serve as a guide every step of the way — from scales and rhythm to more complex musical forms and theory.

With Songwriter, composing songs is as simple as "do-re-mi." Write a song, change, delete or add a note, change tempo and teach the computer to repeat musical motifs. Even save compositions to play back through the computer or your home stereo. For added fun, there is also a library of 28 popular songs to listen to and experiment with, as well as a series of educational activities for adults and children.

Songwriter is like a word processor for music that will bring the whole family back to the computer, again and again — because Songwriter encourages experimentation and makes the whole process fun. Isn't that why you bought a personal computer in the first place?

Every kid has a song in his heart. (So does the "kid" in every parent!) Help yours express it with Songwriter.

Available for Apple®, Atari®, Commodore 64™ and IBM-PC® \$39.95



The Scarborough

© Scarborough Systems, Inc., 25 North Broadway, Tarrytown, New York 10591

CIRCLE 216 ON READER SERVICE CARD

ur creativity.

Be quick on the draw. PictureWriter is magic! Create any shape or pattern, instantly. Fill areas with glowing colors and even hear pictures set to music.

PictureWriter brings out the artist in anyone. With this program, your child can create his or her own picture gallery and watch the computer redraw the pictures like magic on the screen. PictureWriter also includes a library of masterpieces by other "picture writers" that can be colored, edited and redrawn.

Like all Scarborough programs, PictureWriter encourages experimentation and continually challenges the child to explore new avenues. And all the while, PictureWriter subtly develops the child's familiarity with the fundamentals of step by step computer programming.

Getting started is simple. The built-in tutorial zips the artist into the program quickly and keeps him or her creatively occupied for hours.

The possibilities are endless with PictureWriter. In fact, children find it so captivating that parents will probably want to doodle with it, too. And why not?

You can't stay an adult forever.

**Available for Apple® \$39.95
(Soon, Atari®)**

Apple, IBM and Atari are registered trademarks of Apple Computer, Inc., International Business Machines Corp. and Atari, Inc. respectively. Commodore 64 is a trademark of Commodore Electronics Limited.



ough System.

A New Way To Do Graphics On The Apple

Steve Arrants

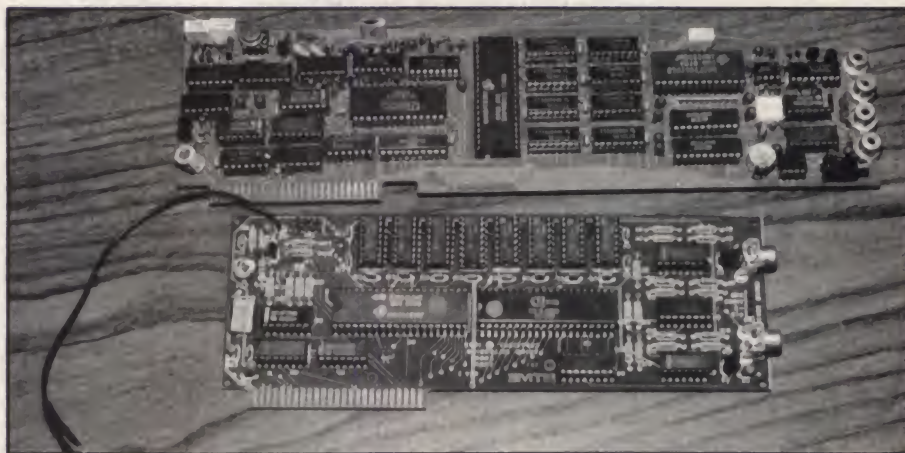
When it was first introduced, the Apple was perhaps the most revolutionary machine of its kind. Though it offered a tiny amount of RAM, no disk-drives, and only a fair Basic, hobbyists and hackers fell in love with it. Well, times have changed. The Apple is now just one product among many. Although the folks in Cupertino have continued to improve the product, graphics and sound are still limited on the Apple.

Go to your favorite arcade. Play Zaxxon or Robotron. Spectacular graphics, right? Life-like sounds? Until now, those effects were only palely imitated on the Apple. Exciting graphics and sound on the Apple were usually achieved at the expense of large chunks of memory.

The Texas Instruments 99/4A, Atari 400 and 800, and even the Commodore 64 and Vic-20 all boast graphics and sound capabilities that make Apple aficionados green with envy. By adding special chips that can produce these effects, manufacturers can not only offer a good computer, but an excellent game machine.

For reasons of its own, Apple has not included these special chips in the IIe. Perhaps they are trying to change the image of the Apple to one of a business machine rather than a game unit. It is interesting to note that the Lisa, built as the quintessential business machine, offers superb graphics capabilities. LisaDraw makes graphics so easy, so foolproof, that I wish those capabilities could have been transferred over to the IIe.

Why has Apple ignored innovations in graphics and sound? Why does creating hi-res graphics on the Apple take more time and thought than writing a master's thesis? And why doesn't Apple offer sprite graphics, which other manufacturers offer as a *sine qua non*? If we look at the history of Apples, it is easy to see that Apple does not try to cover all the possible applications of its machines. Apple Computer does an excellent job in covering



SuperSprite (top) and Arcade Board (bottom).

and supporting business applications, business graphics, and data management. Peripheral manufacturers support the other side—the frills in which a business buyer is not interested. It is the same with sprite graphics and great sound. Peripheral manufacturers see a need and fill it.

Sprite graphics hardware is not too difficult to produce. Neither is the hardware for creating lifelike sounds. Having both of them running in conjunction with Apple graphics, however, is not as easy as it may sound. The same with software. Sprite software is simple to write. But writing the software that allows all of this to go on simultaneously is very difficult. In effect, it calls for the writing of a new language.

Two manufacturers have just released boards for the Apple which make sprite generation possible. Both Synetix Systems Inc. and Third Millennium Engineering Corporation have done the almost impossible. With their new peripheral boards music, speech, sprite graphics, and more are available for your Apple.

They have not only changed the Apple but transformed it. Both products are based on the same principle. The 6502 is fine for what it does, but when generating sound or graphics, it is agonizingly slow. The microprocessor dedicates all of its time and energy to the task of creating,

moving, and changing graphics and sound. Therefore, program execution is slow, especially when the microprocessor must perform other tasks.

Instead of doing tricks with memory or language, a new graphics and sound processor takes over these jobs from the 6502 chip, freeing it for other work. But before we take a look at these new peripheral boards, let's take a look at Apple vs. sprite graphics.

The Limits Of Apple Graphics

If you have ever done any graphics applications with the Apple, you have probably been bothered by color-clashing. Whenever bits are in horizontally adjacent positions, clashing occurs if one bit is on and the other is off. When an object moves across the screen, it causes this clash and erases background it passes over.

This doesn't cause any problems when one or two objects move across a black background. When ten objects fly across an orange background, however, you begin to see how mediocre Apple graphics really are.

As an analogy, think of an animated cartoon. Characters move across the screen, passing freely in front of and behind one another. They can walk into the background or foreground with ease. This

LEARNING with LEEPER

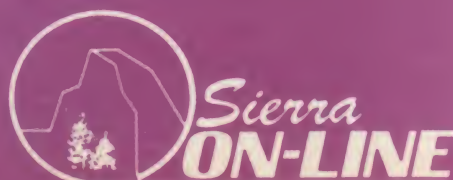


WHY WAIT UNTIL YOUR KIDS ARE IN SCHOOL?

Let Leeper give them a head start in reading, writing and math.
An award-winning collection of four preschool games for the Apple computer.

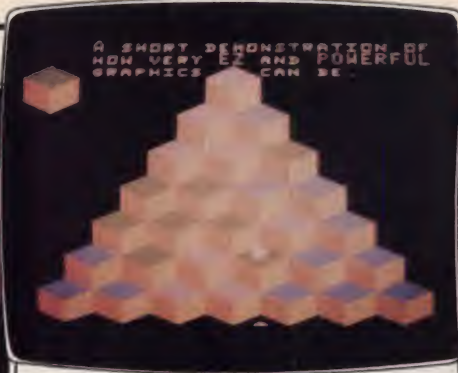
**electronic
GAMES**
Magazine's
Best Educational Game of 1983

CES 1983
SHOWCASE AWARD



TM designates a trademark of Sierra On-Line, Inc.
CIRCLE 205 ON READER SERVICE CARD

NOW AVAILABLE FOR
COMMODORE 64
AND
ATARI



Two sprite scenes. Arcade Board, left and center; SuperSprite, right.

is because these images are *multi-plane*—the entire image is composed of many parts, and each part does not have to be redrawn with each move.

Because Apple graphics are done on a single plane, they are much more difficult to work with. You could always XDRAW or "mask" certain areas of the screen, but both of these methods are difficult, time consuming, and basically unsatisfactory solutions. Each object must be erased and redrawn with each move.

Beyond The Limits With Sprites

Sprite graphics offer greater speed—comparable to assembly language graphics—and are easier to create. There is no XDRAWing, no masking or bit-shifting. Both SuperSprite and the Arcade Board offer 16 colors, which can be overlaid to produce different hues. With 35 graphic planes, almost any effect you can think of can be drawn.

But that is not all—Apple graphics are also available at any time. Think of the possibilities of using 35 graphics planes at once! Instead of redrawing an entire screen, you need only move an object in one graphic plane. For example, if you have a scene of a car driving across a desert, you can animate both the graphic plane on which the car is drawn and that of the background. They are the only planes that you need to bother with. In contrast, because Apple graphics are done on a single plane, the entire scene must be redrawn.

These impressive effects are achieved, using Applesoft Basic and an appended language which uses the ampersand hook to call the sprite graphics functions into use. Since this language is just an extension, it is totally compatible with Applesoft. No other language can make that claim—not Logo, not GraForth, not Pilot.

The potential of these new boards and their languages is exciting. Think how many times you have wanted to write your own commercial quality game but couldn't because learning machine language or GraForth seemed too difficult. With these new products, sprite graphics programming is almost as easy as using regular Apple graphics.

SuperSprite

SuperSprite consists of the Texas Instrument TMS 9918A video display processor, the General Instruments AY-3-8912PSG sound generator, 16K of RAM for video use, and the Echo II Speech Synthesizer. Included in the package is the Star Sprite software, Echo II Speech software, a speaker, cables, and documentation.

Installation is involved. The board *must* be placed in slot 7 to pick up the video trace signal. Four jack inputs on the card must be connected. One goes to a monitor, which allows normal video when the SuperSprite board is not in use. Another connection goes between the card and the video output on the Apple. A third connection is between the card and the monitor

used for sprite and Apple video, and fourth input/output connects the SuperSprite board to an auxiliary amplifier, such as a stereo system.

There are three different software packages for the SuperSprite board. Star Sprite I from Avant-Garde is a beginner's package. Star Sprite II and III are more advanced versions, offering more utilities and more machine language programming information. All disks are unprotected, listable, and copyable, allowing you to make backups and customize programs for your own use. Since the software is useless without SuperSprite, this is understandable.

The software consists of the Ampersprite language, a program to help with the installation and set-up, three short games, and a tutorial. Also included are programs for sprite creation, sprite painting, scene creation, realistic sound generation, and text labeling. Little previous programming experience is required. Simply read the instructions, and you will be creating path and direction tables, mazes, animation sequences, and your own games in no time. If you can program in Applesoft, you can program with Ampersprite.

If you purchase SuperSprite with the Echo II Speech Synthesizer option, you can include human speech in your programs. The Echo II software lets you create spoken words from letters typed in or by phonemes, the smallest distinguishable sound units of a language. The word *Speech*, for example, is composed of six letters but only four phonemes. Using phonemes allows greater control over the speech, making it sound more natural. Also included is Echo Words, a dictionary of 719 words and phrases in a female voice.

The Echo Speech Synthesizer can be used with sprite graphics and within regular Applesoft programs.

CIRCLE 400 ON READER SERVICE CARD

Arcade Board

The Arcade Board uses the same Video Display Processor as SuperSprite. The chip used for sound generation is the General Instruments AY-3-8910, a cousin to that found in the SuperSprite. The package includes software and documentation. No

creative computing HARDWARE PROFILE

Product: SuperSprite

Type: Graphics Board and speech synthesizer

System: Apple II, II+, IIe

Specifications: Texas Instruments TMS 9918A Video Display Processor, General Instruments AY-3-8912 Programmable Sound Generator, Echo II speech synthesizer, support chips, cables, software

Performance: Flawless.

Ease of Use: Very easy.

Documentation: Very good, going beyond mere instruction.

Price: \$395

Summary: A well-designed, excellent package. Very good documentation, software and packaging. One of this year's most important products for the Apple.

Overall Mark: A+

Manufacturer:

Synetix, Inc.
15050 N.E. 95th St.
Redmond, WA 98052

creative computing

HARDWARE PROFILE

Product: Arcade Board

Type: Graphics Board

System: Apple II, II+, IIe

Specifications: Texas Instruments TMS 9918A Video Display Processor, General Instruments AY-3-8910 Programmable Sound Generator, support chips, software

Performance: Very good

Ease of Use: Very easy

Documentation: Preliminary documentation was OK.

Price: \$225

Summary: A good, "no-frills" package.

Overall Mark: A

Manufacturer:

Third Millennium Engineering Corp.
1015 Gayley Ave., Suite 394
Los Angeles, CA 90024

provision for speech synthesis is present, and cables are not provided. The Arcade Board installs in any available slot, although 4 or 7 is recommended. Slot 4 must be used to run any of the demo programs.

Insert one cable from the board into your monitor or television. A wire from the board plugs into the Apple Video Out. This feeds the normal Apple video signal to the Arcade Board for soft-switching between Apple video and Arcade Board video. The final connection is between the board and an external speaker (not provided).

Software consists of the Ampercade language extension to Applesoft and demo programs. Its use is similar to the Star Sprite extension of SuperSprite. The photocopied documentation won't win any literary awards, but it does give an adequate explanation of commands. Included in the documentation package are reference manuals on the VDP and PSG chips. They are nice to have, but I wonder how many users will understand them.

How They Work

Both boards remove from the Apple 6502 all the labor involved in creating graphics and sound. Since the chips on the boards are dedicated to performing only these tasks, they do a much better—and quicker—job. For example, to move a 40-pixel wide character, the Apple 6502 must draw the character, erase it, and redraw it in a new location. To do this involves literally thousands of machine instructions. Basic is too slow, and assembly language is too complex for many users. With the SuperSprite or Arcade Board, the same operation can be done with about ten machine instructions. Even slow Basic can handle this.

The same is true for sound generation. To make a sound on the Apple, you toggle a port to move the speaker cone in and out. The frequency and tone are determined by the rate of toggling. If you wish to have a continuous tone, the 6502 must continually toggle the speaker port. While it is doing this, it can't do anything else. That is why Apple games usually have good graphics with only few sound effects.

You can have animation or you can have sound effects. You just can't have them at the same time. With these boards, the 6502 tells them to create the desired sound until told to stop. The 6502, therefore, is free to direct other things, such as animation. Thus, the combination of the VDP chip and the PSG chip take care of most of the "leg-work" involved in creating graphics and sound.

The commands used with both boards are quite simple to use in a normal Basic program. Use regular Applesoft Basic graphics commands for Apple graphics. To use sprites and sound effects, you must use the special language extensions.

All must begin with an ampersand (&). For example, the line

10 & RX 15, 6

in Star Sprite will change the text color to 15 (white) and the background to 6 (red). The lines

10 & SOFF

20 & TNA, 256, 15

initialize the sound chip and then generate a tone in channel A with a pitch value of 256 and a volume of 15 with Ampercade.

To do these operations with an unextended Applesoft would involve many more lines of programming. In the first example, you would have to write a character gen-

eration program in high-resolution graphics, which would involve a shape table. In the second example, you would do a series of POKEs and value statements. With SuperSprite and Arcade Board, effects such as these are easy.

All other commands are just as easy. The creation of sprites is more difficult, involving pattern tables, path tables, and animation editors. Doing that is almost as easy—and as difficult—as using a commercial Apple graphics package. You can't enter a few commands and expect marvelous shapes and sounds to pop out of an Apple. Using these new boards involves learning a new type of graphics.

Summary


As the pictures show, sprite graphics add a totally new dimension to Apple graphics. I showed off SuperSprite at a few user's group meetings. People couldn't believe that I had the monitor connected to an Apple. When the people at Synetix came to our offices to show us SuperSprite, I couldn't believe it either. But I have used both boards and become a believer. The Apple now has the same graphics and sound capabilities found in the Commodore 64 and Atari in addition to Applesoft and the other unique Apple features.

The programming possibilities are exciting. Challenging games and innovative programs are now within the grasp of any Apple owner. A vast knowledge of assembly language is not needed; the programming can be done from Applesoft with the sprite language extensions.

Will this be the next step for Apples? Will software be written to use these boards? These are interesting and important questions. There is no doubt that both boards work and that they can enhance the Apple. Unless software authors write programs that use them, however, both may go to the peripheral graveyard. Without software, they make great paper-weights.

Which of the two is the best? The SuperSprite package offers the Echo Speech Synthesizer and better software. The Star Sprite software is designed for a range of users, from beginners to professional programmers. The documentation is excellent and not confusing, even when explaining complex ideas and applications.

The Arcade Board package has fewer frills but is far less expensive. Bear in mind, too, that we had an early version with preliminary documentation and software. The Arcade Board does what it promises, but, at the moment, I think SuperSprite delivers more.

Software is generally incompatible between the two products. A program written for the SuperSprite may not run on the Arcade Board and vice versa. 

CIRCLE 401 ON READER SERVICE CARD

Comparison of 6502 Graphics with Sprite Graphics

- Machine language and sprite graphics are much faster and smoother than 6502 graphics.
- Machine language and sprite graphics are easier to do than 6502 graphics. There is no XDRAWing, masking, refreshing, bit-shifting, or pre-shifted shapes, just coordinate changes.
- Graphics and sequences impossible to do with the 6502 are easily programmed with sprites.
- More colors are possible, and colors can be blended with sprite graphics.
- Sprite graphics offer 35 graphic planes in place of the normal one plane available with 6502 graphics.
- Sprite graphics and 6502 graphics can be combined with no color-clash or distracting interaction.

EASEL: A System For Artists

Figure 1. Simple Landscape.

Barbara Mackowiak

If you sit down at a computer paint system, you expect to be able to do some of the basic things you do with pen and brush, ruler and compass. Draw a straight line or a circle. Erase it and redraw it in a wider line. Paint in some red here, some blue there. Soften the edge with a little airbrushing.

Then you push forward a bit. Say you would rather all that red were a little brighter. Perhaps move that bit of freehand drawing in the corner more toward the center, and make it twice as big. Then you might like to see how the picture would look if the right side of the screen were a mirror image of the left side. Soon you are altering resolution, remapping colors, and storing in buffers, as no human with ruler and compass ever could.

This is a fairly accurate description of the path I followed with *Easel*, a professional graphics arts program developed by Time Arts Inc. The name is an acronym for Editor and Animation System with Extensible Library.

Using *Easel*, you draw with an electronic pen and tablet, with gestures similar to those used for drawing on paper. The image appears on a high quality RGB monitor.

As soon as *Easel* is loaded into the computer, the pen is active. Any freehand drawing you do with the pen appears immediately on the monitor screen.

Figure 2a. Variations.



To choose a different pen type, to change a color, to retrieve an image saved on the computer disk, or to select a command for changing an image onscreen, glide the digitizing pen down on the tablet. This brings to the bottom of the screen a menu containing commands, a color palette, and a status box with information on the current drawing mode. To select a command, put the cursor in the menu command box and press down on the pen.

If you want information about any menu command, press the "doc" icon before selecting the command. A concise description of the command will appear on the computer terminal.

The Main Menu comes up on the screen whenever *Easel* is loaded. It lists other menus in the program, each of which carries a set of related commands.

The Tint command allows you to tint a range of colors from the first color chosen to the second color chosen.

The Pens Menu has the basic drawing modes, such as Pen, Brush, Airbrush, and Line, which can appear in any of eight sizes. The Brush Menu has several special brushes, as well as a command which allows you to create your own brush. Color has commands for changing a single color; CMaps (color maps) for changing several colors at a time; Fills for changing a color on a selected area of the screen; Shape for drawing simple geometric figures; Move for manipulating images onscreen; Frame for saving images on disk and recalling all or part of an image back to the screen.

The final entry in Main is the Etc Menu. Like Main, Etc is a menu of menus. This layering opens up the system, allowing *Easel* to be extended indefinitely. In the *Easel* I used, the Etc Menu lists Misc, a menu of commands, such as grids and gravity lines, that help in arranging images; SetRes, a menu of commands for moving between high- and low-resolution screens; Scale for rescaling, tapering, and putting images into perspective; Shear for shearing, tilting, and rotating images; Video for digitizing an image with a video camera; and Cells for storing

and accessing image cells for custom brushes and fonts.

The pictures accompanying this article illustrate some of the effects possible with *Easel*. The text below describes the commands I used in making the images.

A Simple Landscape

The sky in Figure 1 is composed of colors shaded from pink to blue through the Tint command. In preparation for tinting, I changed two colors—the pink at the horizon and the darkest blue at the top of the picture. To produce the pink, I used the RGB (red/blue/green) command to make the color in position one of the palette a medium red; then, using the Mix command, I added white and blue to make the appropriate shade of pink. For the darkest blue, I used RGB on the color in position seven making it a medium blue, then used Mix to darken it.

The Tint command allows you to tint a range of colors from the first color chosen to the second color chosen. By pressing the pink and then the blue, I tinted the five intervening colors of the palette.

As it happens, I made these color changes first, then began drawing. However, I could just as well have done the picture first, composing the sky of any consecutive colors in the palette, and then tinted the colors. Any changes in color mapping in the palette appear throughout the image onscreen.

Variations on a Theme

The system I used in Figures 2a, 2b, and 2c determines colors through mapping. In color mapping, the value of a pixel is not a specific color; instead, it is an index to a map or table of color combinations and variations of the basic red, blue, and green that make up all video colors. The table entry determines the hue and intensity of the color on the graphics screen. "Mapping" a color means referring to a place on this table for the composition of the color. With this system, even though only 16 colors can appear on the screen at a time, the number of colors possible is vastly larger.

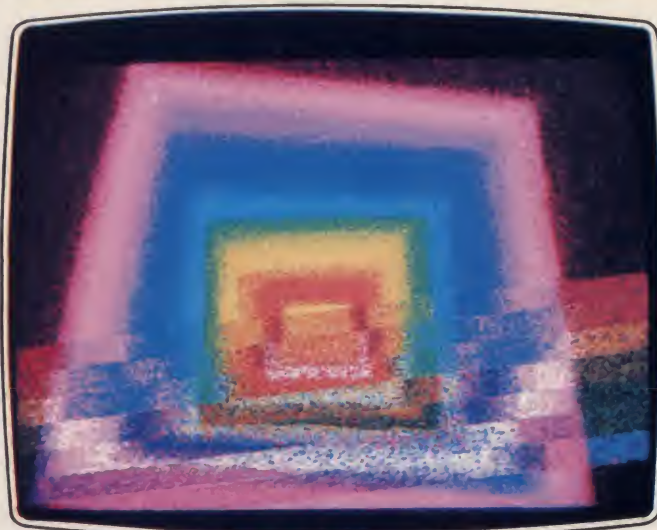
There are two menus of commands that control color mapping. Commands in the Color Menu affect one selected color, which appears as the "current color" in the status box of the menu. Mix, used in the previous picture, lets you blend any other color into the current color by putting the cursor over the color to be blended in; the chosen color will continue to be added in as long as you press on the pen. Luminance lets you adjust the brightness of a color by moving the digitizing pen left

Figure 2b. Variations.



Figure 2c. Variations.



Figure 3. *Strange Prism.*

or right on the tablet. RGB lets you selectively change the red, blue, or green component of a color. Xchcol exchanges any two colors onscreen.

Commands in the CMaps Menu affect the mapping of several colors at a time. Tint, used in the previous picture, shades all colors from the first color pressed to the second color pressed. RMap brings to the screen a palette of random colors that change continuously as long as you keep the cursor in the RMap command box.

Since a change in the mapping of any color changes all instances of that color onscreen, you can quickly see the effect of any change on the entire image. This series shows the same image with different color mappings. (I have left the menu onscreen to show how the palette looks for each picture.)

Easel contains a variety of pens and brushes.

A Strange Prism

Easel contains a variety of pens and brushes. These include special brushes, such as Airbrush, which deposits a spray of up to four colors, and Char, which deposits characters in a brush mode, as well as the standard brushes that lay down solid color. In general, pens and brushes replace whatever color they cover. That is, a red line will be red, whether it covers black, green, or yellow.

The X brushes, however, activate a Boolean "exclusive OR" function. Used over background (position 0 in the palette), each color paints as it appears in the palette. Used over another color, the X brush produces a third color. For example,

the color in palette position 10	1010
used over the color in position 9	1001
produces the color in position 3	0011

What color actually appears depends on how the color in the position is mapped.

In the Prism shown in Figure 3, I did the basic figure with the standard Brush and softened the borders between colors

Figure 4. *Concrete Poem.*

with an Airbrush spray, using equal parts of each color. The diagonal bands I did with Ring X, a ring-shaped brush that uses the exclusive-OR function. The colors of both the basic figure and the diagonal bands are sequential colors from the default palette—the palette that comes up whenever *Easel* is loaded.

Concrete Poem

The Type command allows you to type on the graphics screen from the keyboard. The position of the cursor when you enter the type mode determines where the text begins and sets the left margin. Keys such as DELETE, RETURN, space bar, and SHIFT work as usual. Typed text appears in the current color and covers any color onscreen. Once you leave the type mode (by pressing the ESCAPE key), the type onscreen is just like any other part of the image, and you can manipulate it with any of the graphics commands.

For the picture in Figure 4, I typed each of the four basic words onto the screen, positioned them with the Move command and changed their dimensions with the Zoom command. I doubled the size of *land* and expanded the height of *sky*. *Sunset* remains in its original size.

Rather than typing each word over and over, I used the Dup command, which allows you to duplicate an image repeatedly to fill a defined area of the screen. For the clouds, I typed *cloud* and then made a "stamp" of the word with the Rubberstamp command. The entire word would then appear whenever I pressed on the pen.

After all the words were in position, I used Maskbrush to recolor some of them. Maskbrush lets you paint over a selected color and masks out all the others, so I could easily recolor some of the yellow sunset words to red without harming the surrounding background color.

Although *Easel* is available to run on a variety of hardware, I used a Z80-based system with an image resolution of 756 x 482. Sixteen colors were simultaneously available out of a possible 4096. I photographed the pictures directly from the monitor.

Easel is supported by Z80, 8086/88 and 68000 systems including the IBM PC and is customized to work on a variety of frame buffers. The prices, as well as the implementation of some features of the software, vary with the hardware but begin at \$625.

Time Arts Inc., 4425 Cavedale Rd., Glen Ellen, CA 95442.





A Little Bug Can Do A Lot Of Damage.



It looks so little, but it eats so much—just like the contamination on your computer's disk drive head. It may not seem like much, but all it takes is a micro-sized particle of dirt to wipe out a lot of data, and once it's gone, it's gone forever.

That's why you need PerfectData. The PerfectData Disk Drive Head Cleaning Kit eliminates problem-causing dirt so you can keep your computer and your data the way you want it—perfect.

The PerfectData Disk Drive Head Cleaning Kit cleans single or dual-sided drives simply and effectively.

PerfectData's patented wet/dry method is the cleaning method recommended by most leading computer and disk drive manufacturers.

The Disk Drive Head Cleaning Kit is just part of a whole family of PerfectData Computer Care Products—all designed to keep your computer and your data in perfect shape. So don't let a bug eat holes in your rose (or data). Visit your Computer Dealer today for PerfectData products. PerfectData Corporation, 9174 Deering Avenue, Chatsworth, CA 91311.

Keep It Perfect.

PerfectData
COMPUTER CARE PRODUCTS

PerfectData is the new name of Innovative Computer Products—the leader in computer care since 1976.

CIRCLE 151 ON READER SERVICE CARD



Announcing

THE NATIONAL HISTORICAL SOCIETY

CIVIL WAR CHESS SET



Richly detailed portrait sculptures of great American heroes
—in solid pewter, solid brass and fine enamels.

A heirloom chess set to be enjoyed for generations.

Created by the world-famous craftsmen of The Franklin Mint.

THE NATIONAL HISTORICAL SOCIETY is dedicated to bringing the excitement and power of American history—as well as its significance—to people in every part of the land.

It is in keeping with this purpose that the Society is about to issue its own Civil War Chess Set. A dramatic tribute to the heroes of both North and South—and a work all the more intriguing because the playing pieces include richly detailed three-dimensional *portrait sculptures* of the great Generals of Union and Confederacy, captured for the ages in solid pewter, solid brass and fine enamels.

This extraordinary new chess set will be crafted to the highest standards of quality and historical authenticity. The National Historical Society has appointed The Franklin Mint to create the sculptures, each of which will be a new and original design. Some figures will be shown standing, some seated, some kneeling, some mounted on horseback. And each figure will be painstakingly crafted of solid pewter, hand-finished, then set atop a solid brass pedestal base embellished with a circular band of richly colored enamel—*blue* for the soldiers of the North, *gray* for those of the South.

Every sculpture, moreover, will be so rich with authentic detail that only the artists and master craftsmen of The Franklin Mint, steeped as they are in the tradition of *precision coinage*, could have achieved it. Indeed, every nuance of facial expression, uniform and weaponry—right down to the buttons, braiding, sabers and carbines—will be depicted with meticulous accuracy.

Thus, The National Historical Society Civil War Chess Set is also a magnificent collection. A triumphant achievement of portrait sculpture—and the ultimate in micro-detailed miniaturization.

ALL FIGURES SHOWN ACTUAL SIZE.



Major General
William Tecumseh Sherman
BISHOP



General in Chief
Ulysses S. Grant
KING



General in Chief
Robert E. Lee
KING



Major General
J.E.B. Stuart
KNIGHT

Available only by direct subscription. Issue Price: \$17.50 per sculptured chess piece.
Limit: One complete set per subscriber. Please enter your subscription by February 29, 1984.



This handsome pewter-finished chessboard and fitted presentation case will be provided as part of the set.

A dramatic showpiece for your home or office

The chessmen themselves are scaled so that each one will suit the function assigned to it in the game of chess. And the handsomely crafted, pewter-finished playing board has been sized with equal care. Specially fitted, to also serve as the cover for the case which will house all 32 playing pieces, the board completes a presentation so attractive that the chess set will be played and displayed with pride and satisfaction. A Certificate of Authenticity, and specially written reference materials, will also be provided.

Exhibited on a table or cabinet in your living room, family room, den or office, this is a possession certain to evoke both admiration and respect from all who see it. A unique tribute to unique Americans. A work of heirloom quality, that will bring you endless pleasure through the years. And a chess set eminently worthy of being passed on from generation to generation.

The subscription rolls are now open. The work may be obtained *only* by direct subscription, with a limit of one complete set per subscriber.

The chessmen will be issued to you at the attractive price of \$17.50 each, with the specially designed playing board and protective case provided at no additional charge. As a subscriber, you will receive two sculptured pieces every *other* month. You will, however, be billed for only *one* chessman at a time—a total of just \$17.50 per month. In addition, you will have the option to complete your set earlier, if you wish—but you will be under no obligation to do so.

Here, then, is a work that will bring lasting pleasure to chess enthusiasts, history buffs, collectors of military miniatures—to anyone who appreciates our nation's heritage. Indeed, it is an unmistakably American chess set, that will make a dramatic addition to any room. And an exciting showpiece that will be displayed, enjoyed and treasured by each succeeding generation.

To acquire The National Historical Society Civil War Chess Set, no advance payment is required. But please note that the accompanying Subscription Application is dated and should be returned postmarked by February 29, 1984.

© 1984 FM

SUBSCRIPTION APPLICATION

The National Historical Society CIVIL WAR CHESS SET

Please mail by February 29, 1984.

The National Historical Society
c/o The Franklin Mint
Franklin Center, Pennsylvania 19091

Please enter my subscription for The National Historical Society Civil War Chess Set, consisting of 32 chessmen.

I need send no money now. I will receive two new playing pieces every *other* month, but will be billed for just one piece at a time—\$17.50* per month—beginning when my first shipment is ready to be sent. I will receive the fitted presentation case and pewter-finished chess board at no additional charge.

**Plus my state sales tax and \$.50 per chessman for shipping and handling.*

Signature _____

ALL APPLICATIONS ARE SUBJECT TO ACCEPTANCE

Mr./Mrs./Miss _____

PLEASE PRINT CLEARLY

Address _____

City _____

State, Zip _____

Limit: One complete set per subscriber.

121

Apple Graphics Software

I have a confession to make. I didn't buy my Apple to do graphics. I was always more interested in word processing, telecommunications, and text adventures. The joys of HLIN and VLIN always eluded me. Plotting and drawing on an Apple were never very interesting. I couldn't seem to put together an error-free shape table. Then again, the Apple was not designed as the best graphics machine available. The right software can do amazing things, however. That said, let's look at some new graphics packages for the Apple and see what they can do.

Flying Colors

Flying Colors is an interactive software package that lets you create high-resolution drawings with a minimum of effort and time. A joystick, paddles, graphics tablet, or KoalaPad is needed.

After booting up the disk, you choose the F option for *Flying Colors* or the P option for the Slide Projector. In a few seconds, the screen clears, and you are ready to draw, paint, or doodle. At the right of the screen is a menu for selecting which type of shape you wish to draw,



Flying Colors.

Steve Arrants

such as a box or circle. You can clear the screen, access the disk, place keyboard characters on the screen, draw lines, or select a brush type. Choosing the latter brings you to another menu where color is selected, along with the width and size of brush.

creative computing

SOFTWARE PROFILE

Name: Flying Colors

Type: Drawing System

System: Apple II, II+, IIe

Format: Disk

Language: Basic and machine language.

Summary: Very easy to use.

Price: \$39.95

Manufacturer:

The Computer Colorworks
330 Bridgeway
Sausalito, CA 94965

You select these options with the input device. Just move the cursor over your selection and press button 0. Button 0 also functions as the brush tip. When it is pressed, drawing action occurs. Think of it as controlling the flow of paint or ink to a brush. Button 1 displays the menus. It also aborts a drawing function in progress.

You can choose from 20 colors, two whites, and two blacks. If you use colors from different sides of the chart, artifacting will result. Artifacting occurs when certain colors are placed next to

each other on a graphics page. For example, if a green circle is placed on a blue background, the boundary between them may have other colors. This is annoying, but easy to fix. Just use a broad brush or the Fill option to color over the artifacting.

If you use a non-solid color, such as stripes, it is difficult to cover over or erase them. The Apple sees only one of the colors at a time, and therefore covers only one of them. If you want to cover a patterned background, select a broad brush and just draw over the area. It is much quicker, and easier to control.

The Alpha option lets you place keyboard characters anywhere on your picture. Select this option, and move the cursor to the place where you want the text to start. Type from the keyboard as usual, and end by selecting another menu option.

A Micro option allows for accurate freehand drawing. In this mode, cursor movement is confined to a very small area in the drawing field. The cursor only moves within this area while drawing.

Pictures can be saved or retrieved from disk. You can also retrieve pictures



Flying Colors drawing page is typical of many graphics packages.

"There's No Time Wiser Than After Dark."

**BEAT THE APRIL FEE INCREASE!
BE WISE. SIGN UP NOW
AND SAVE!**

When you're looking for solid, up-to-the-minute information, the best place to search is BRS/AFTER DARK. The one system designed for serious searchers, AFTER DARK offers you more databases citing more authorities on more subjects than any other popular online information service—at the lowest cost.

For only \$6 to \$20 per connect hour, including telecommunications charges, you can personally access the same online files used by major reference libraries and corporations worldwide. These files contain the latest information on subjects ranging from business management, mathematics and education to health, psychology, chemistry, family planning, and just about everything in between.

The range of databases available keeps expanding all the time. AFTER DARK now brings you the full text of the **Academic American Encyclopedia**, as well as the **Harvard Business Review**.

CIRCLE 104 ON READER SERVICE CARD



And for microcomputer buffs, there's a new online Software Directory listing major software packages.

AFTER DARK's simple, interactive language and straightforward logic take only minutes to master.

The system is outstandingly comprehensive, remarkably fast, and above all, fun to use. All you need is your classified BRS password and any dial-up system. Then, every weekday from six in the evening until the early morning hours—round the clock on weekends and holidays—you can summon up a wealth of valuable information.

Use the coupon to sign up for BRS/AFTER DARK before another evening goes by. Seriously, it's like having your own university library online at home.

BRS 
COLLEAGUE
AFTER DARK

CC 2/84

EXPANDED SERVICES: MORE DATABASES, ELECTRONIC MAIL AND SHOP AT HOME. ONE-TIME SUBSCRIPTION FEE ONLY \$50 (\$75 AFTER APRIL 15, 1984).

() Sign me up for BRS/AFTER DARK now! I understand I will be charged a subscription fee of \$50 plus connect hour rates as low as \$6 per hour, billed to my credit card account with a monthly minimum charge of \$12. (My order must be postmarked before midnight 4/15/84.)

() Send more information on BRS/AFTER DARK.

Mail to BRS • 1200 RT. 7 • LATHAM, NY 12110 • (518) 783-1161

Name _____

Address _____

City _____ State _____ Zip _____

Charge to MASTERCARD/VISA/AMERICAN EXPRESS
(Circle one)

Acct. No. _____

Expires _____

Signature _____

Apple Graphics, continued...

drawn or created with other graphics packages.

Included with *Flying Colors* is a slide projector program. Reboot the program disk and select the P option. Insert your picture disk when prompted.

Press S to select slides. Another menu appears, showing a catalog of pictures on the disk. Enter the slides into the tray in any order. Up to 16 slides can be placed in one tray, but you can link disks together to get an unlimited number of slides. Press ESC to return to the main menu.

Back at the main menu, you can select the time each slide appears on screen, from 1 to 99 seconds. You can choose whether to change slides manually—by button or keypress—and determine how a slide appears on a screen—by blending it into a previous slide or clearing the screen before the next slide appears.

The documentation consists of two disk size booklets. They are easy to understand, but I don't think you will need the *Flying Colors* book to get going. Experimenting with the *Flying Colors* program can teach you as much as the documentation can. Use it as a reference instead of road map. *Flying Colors* is copy-protected, and comes with a 90-day warranty.

I like *Flying Colors*, though I admit it won't help me become a computer artist—the talent just isn't there. But it is easy and fun to use. *Flying Colors* is good if you want to go beyond normal Apple graphics. I tested it on some neighborhood children, and they had no problems with it. It is a great choice for the schoolroom at any level.

Pixit

Pixit is described as a graphics processor. It consists of three linked programs—a Picture Editor, Create-a-Shape, and a Shape Table Editor. *Pixit* is menu driven; to go to the next level in a program, you are prompted for the next action. For example, when using the Picture Editor, you are prompted to select a shape table, character set, and create a

picture, in that order. Selecting the Load Shape Table function brings you a catalog of all shape tables on a disk. Arrow keys select which table to load. After loading a shape table, you load a character set in the same way. Now that both of these are loaded, select Create Picture and you are shown the editing screen.

The flashing cross at the center of the screen is the cursor. Near the bottom are two lines of information showing the current status of the screen. X and Y tell cursor location, and if you know any Applesoft Basic, you should recognize XDRAW, HCOLOR, ROT, etc. The values shown are identical to those used in Applesoft high-resolution graphics commands. Hitting ? calls up a Help screen.

Two sets of keys move the cursor or shape across the screen. W, A, S, and Z move the cursor ten pixels, while I, J, K, and M move it one pixel. The spacebar selects the first shape in the table and places it on the screen. Use the cursor keys to put it in place. When you are satisfied with placement, the P key and RETURN lock it into place.

Flying Colors is good if you want to go beyond normal Apple graphics.

Adding text is just as easy. Press T to enter the Text mode. The cursor is replaced with a flashing > . Type text from the keyboard.

This is fine if you all want to do is use the predesigned shapes included with *Pixit*, but what about designing our own shapes and pictures?

The Apple II high-resolution graphics page is made up of 192 horizontal lines, each containing 280 dots or pixels. The pixels are numbered 0 to 279 across each line. An image is formed by lighting up

certain pixels in certain patterns. Think of an electronic billboard made up of a grid of lights. By turning on different lights at different intensities an image is created. To create an image on a high-resolution page, you could do a series of HPLOTS. To draw a complex image might require hundreds of HPLOTS, since there are more than 53,000 pixels on a high-resolution page. Who wants to spend the next two months HPLOTTING?

An easier way is to create a shape table. A shape table consists of all the information the Apple needs to plot a shape or image on the screen. Once defined in a shape table, all that is needed is a simple DRAW command from Basic. A shape may be placed anywhere on the screen, rotated, scaled, or drawn in different colors. A shape table can contain one or many shapes. The information in a shape table is a series of directions or vector plots. Each vector determines whether or not to turn on the current pixel and which direction to move.

Still, as easy as it sounds, creating a shape table is tedious and time consuming. A much better choice is a program that lets you plot out each step on screen, edit it, and then save to disk as a shape table. *Pixit* does this and does it very well. By having *Pixit* do the legwork, you are free to concentrate on the creative aspect.

Create-a-Shape prompts you for the drawing scale, 1 to 4 times actual size; grid or no grid options; and the starting location of the shape. The same movement keys used in the Picture Editor are used here. I, J, K, and M plot one pixel and then move over one pixel. The A, W, S, and Z keys move the cursor one pixel without plotting. The regular Apple cursor control keys are used in editing. The right arrow steps the cursor ahead in file memory, while the left arrow steps backward. CONTROL-B moves the cursor to the beginning of the file, CONTROL-E traces forward all the way to the (you guessed it) end of the file. CONTROL-X lets you change the drawing scale, grid option, or starting location at any time without distributing the file in

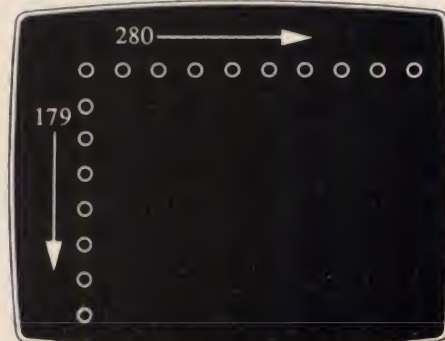


A *Pixit* cable car.

creative computing

SOFTWARE PROFILE

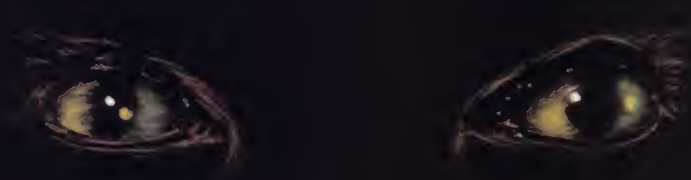
Name: Pixit
Type: Picture and shape creator
System: Apple II, II+, IIe
Format: Disk
Language: Applesoft and machine language
Summary: Flexible and fun.
Price: \$49.95
Manufacturer:
Baudville
1001 Medical Park Dr., S.E.
Grand Rapids, MI 49506.





Pixel placement on the Apple screen display.

WILDCAT™

Looks Like an IBM™
Works Like an Apple™



To a land where fruit  and flowers  reign supreme, comes the awesome power of the **Wildcat** to challenge their supremacy.

Wildcat is a sleek styled mobile computer designed for your vehicle, boat or aircraft. It looks like an IBM PC™ and is fully software compatible with the Apple II™ product line at a list price that would put a smile on the face of the most frugal computer buyer.

But price isn't everything. All those features that would cost you hundreds of dollars extra from our competitors, come standard with **Wildcat**. Let's compare some of these features:



	Apple IIe	Wildcat
Detachable keyboard	No	STD
Full numeric key pad	Option	STD
Full functions keys	No	41
Built in disk controller	No	STD
Parallel printer port	No	STD
RS 232 serial port	No	STD
Game port	1	2
RGB video out	Option	STD
Composite video	STD	STD
RF video for TV	Option	STD
CP/M	Option	STD
Hi Res graphics (6 color)	STD	STD
Low Res graphics (16 color)	STD	STD
64KB memory	STD	STD
Half high disk drives	No	STD
Converters for vehicles, boats, and aircraft	No	Option
Aluminum carrying case	No	Option
List price	\$1940*	\$1099.00*

For more information on the all new **Wildcat**, see your local computer dealer or call or write:



**COMPUTER AND
PERIPHERAL PRODUCTS**

1530 S. Sinclair
Anaheim, CA 92806
(714) 978-9820

*Computer plus one disk drive

Warning: This equipment is exempt from compliance with FCC testing requirements pursuant to 47 CFR 15.801 (c) (1).
Operation of this equipment in a residential area may cause interference.

IBM is the registered trademark of International Business Machines Corp.
Apple is the registered trademark of Apple Computer, Inc.
Apple II is the trademark of Apple Computer, Inc.

CIRCLE 181 ON READER SERVICE CARD

Apple Graphics, continued...

memory. CONTROL-F marks the current cursor position as the last move without disturbing the file in memory. This allows you to delete all unwanted moves from the end of the file in memory. When you are finished plotting your shape, you may compile it into a standard Applesoft shape table.

The final program is the Shape Table Editor. This is used to build shape tables of up to 128 shapes. These shapes can be from the *Pixit* Create-a-Shape program, from a standard Applesoft shape table, or from another graphics package. Available shapes are shown on the right, and the new shape table on the left of the screen. Load a previous shape or shape table, and you are ready to begin building a new shape table. Select Add to place a shape in the new table. Scan through the available shapes to pick another one for your table, or load in another table to select other shapes. At any time you may add, delete, or insert shapes anywhere within the new table.

The documentation is good, taking you through each part of *Pixit* with a minimum of fuss. *Pixit* is not copy-protected, and is listable, so you can modify the programs to suit your own needs. Because *Pixit* uses a non-standard boot program, the usual disk copy programs will not work. Instructions for backing it up are included. *Pixit* is an excellent choice for the beginner. It is easy to work with and forgiving of errors, and the instructions and accompanying tutorials are clear and concise.

The Graphics Magician

The Graphics Magician is a set of editors and routines that helps you create graphics and animation for use in your own programs. This package combines the best of programs such as *Pixit* and *Flying Colors*, though it is much easier to use.

The Graphics Magician consists of two main modules, the Animation system and the Picture system. The Animation system, in turn, is made up of a shape editor, a path editor, and an animation editor. Also included is a documentation utility which prints all the information and addresses for a finished animation file.

First, create a shape. After answering a few set-up questions, such as width and height, the screen clears and shows seven identical sections each bordered by four dots and topped by an orange line. Each of the seven sections makes up one animated figure. For example, rotating the second, fourth, fifth, and seventh sections gives you a rolling figure when animated. At the bottom is a list of commands. Plotting of the shape is controlled by the keyboard. After creating a

creative computing

SOFTWARE PROFILE

Name: The Graphics Magician

Type: Picture and shape creator and animator

System: Apple II, II+, IIe

Format: Disk

Language: Applesoft and machine language

Summary: One of the best, used by the pros.

Price: \$39.95

Manufacturer:

Penguin Software
P.O. Box 311
Geneva, IL 60134

shape, you may animate it to see how it looks as it moves.

The next step is to create a path for the object. Again, all movement and plotting are cursor controlled. Plot the path across the screen, editing it as you

**One nice feature of
The Graphics Magician
is that a mistake in
drawing can be deleted
with a single keystroke.**

go along. When finished, save it and go on to the Animation editor. Here, you are prompted as to which shape and path to load. You may begin anywhere along the path. When you are satisfied, save the file and exit *The Graphics Magician*. At this point, all you have is a binary file on your disk. All you have to do is write a simple, three-line Basic program to run your animation.



Graphics Magician, a background scene.

The Picture System is almost as easy to use. This system lets you create screen pictures that take the minimum of storage space—about 8K. Instead of remembering the screen as a whole, *The Graphics Magician* remembers the movements used to create the screen. Since the sequence is remembered instead of the whole picture, size is kept to a minimum, and the time to BLOAD is shortened.

You design pictures with a joystick, paddle, trackball, or graphics tablet. When you select the Picture editor, you select the input device. Drawing a picture or scene with *The Graphics Magician* is similar to using the drawing program of *Flying Colors*. You select the brush size and color with the input device and toggle back and forth between the selection screen and the page upon which you are drawing. One nice feature of *The Graphics Magician* is that a mistake in drawing can be deleted with a single keystroke. You don't have to throw out the picture and restart or draw over the error. Pictures can also be combined with animation files.

Included in this revision of *The Graphics Magician* is a Hi-Res Text Generator for placing text on the graph-



“...I told the computer what we had in the refrigerator and this is what it came up with...”

Thanks to a remarkable notebook-sized computer made by NEC, you can take your office with you anywhere you go. On a plane, on a park bench, on the way to a meeting, or even on a beach.

Though it weighs only 4 pounds, the battery-powered, CMOS-based PC-8200 packs a 16K/ROM memory expandable to 96K. And 32K of ROM expandable to 64K. You get a big 40-character/8-line screen. Plus

NEC gives you 14 free software packages to start, including an investment portfolio and word processing.

With its built-in software and telecommunicating capabilities, you can use the PC-8200 for word processing, time sharing, data entry, record keeping, and for electronic mail. You name it.

It's made by NEC—a world leader in computer and communications technology.

NEC

NEC Home Electronics (U.S.A.), Inc.
Personal Computer Division
 1401 Estes Avenue
 Elk Grove Village, IL 60007

NEC Corporation, Tokyo, Japan

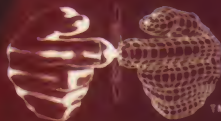
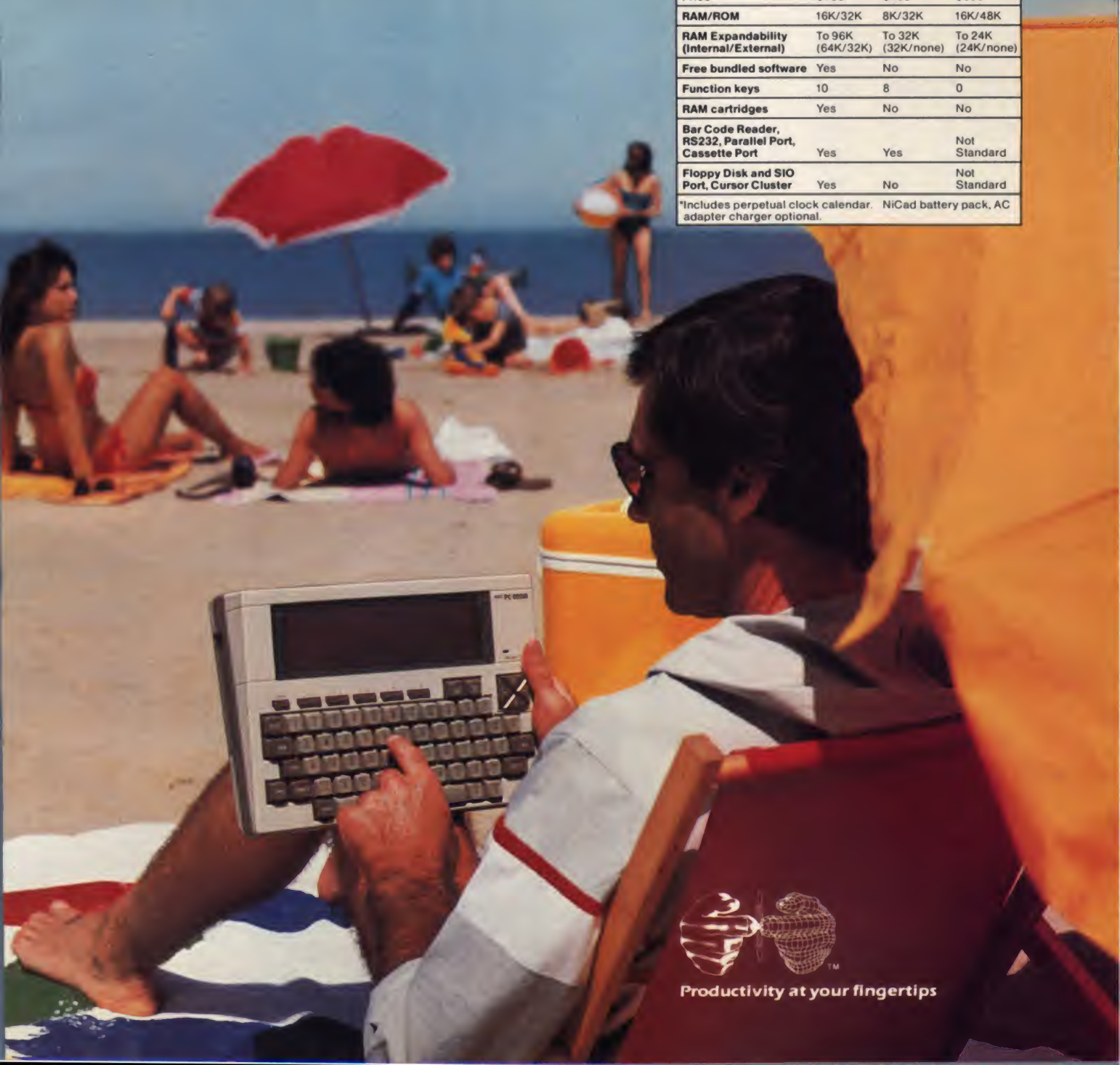
CIRCLE 144 ON READER SERVICE CARD

NEC reinvents the office.

NEC beats the leading competition hands down:

	NEC PC-8200	Radio Shack Model 100	Hewlett- Packard HP-75
Price	\$799*	\$799	\$995
RAM/ROM	16K/32K	8K/32K	16K/48K
RAM Expandability (Internal/External)	To 96K (64K/32K)	To 32K (32K/none)	To 24K (24K/none)
Free bundled software	Yes	No	No
Function keys	10	8	0
RAM cartridges	Yes	No	No
Bar Code Reader, RS232, Parallel Port, Cassette Port	Yes	Yes	Not Standard
Floppy Disk and SIO Port, Cursor Cluster	Yes	No	Not Standard

*Includes perpetual clock calendar. NiCad battery pack, AC adapter charger optional.



Productivity at your fingertips



QUARK INTRODUCES CATALYSTTM IIe


The Only Hard Disk
Program Selector
for the Apple IIe and
Apple II Plus.

A hard disk makes your Apple IIe or 64K Apple II Plus even more powerful. And makes you even more productive. But you still have to load a new floppy and reboot when you need to change programs. And the more programs you have, the more time you waste.

That's why Quark developed CatalystTM IIe. A unique ProDOS program selector that lets you switch between even copy-protected programs. Without rebooting. A few keystrokes move you from Word Juggler IIe to your spreadsheet, then to your file management system, and so forth. Just boot Catalyst IIe when you turn on your machine, and you may not need to touch another floppy all day.

The convenient menu lists the programs you've stored on your hard disk, organized in any way you wish. You can automatically install virtually any programs which use Apple's new ProDOS operating system.* Including software from Quark, Apple Computer and other leading manufacturers.

Catalyst IIe is an affordable \$149. So see your favorite dealer today for a complete demonstration. And while you're there, look into Quark's other office automation tools for the Apple IIe and Apple III. Powerful programs that are easy to learn. And use. At prices that are as intelligent as the software.



Quark, Catalyst and Word Juggler are trademarks of Quark Incorporated. Apple, ProDOS and ProFile are registered trademarks of Apple Computer, Inc.

For the name of the Quark dealer nearest you, call 1 (800) 543-7711.

© 1983 Quark Incorporated

*Not compatible with programs written for DOS 3.3, Pascal, CP/M or any other Apple operating system.

Quark[™]
INCORPORATED

Office Automation Tools
2525 West Evans, Suite 220
Denver CO 80219

CIRCLE 152 ON READER SERVICE CARD

Apple Graphics, continued...

ics screen. A binary transfer utility prints the starting address and length of a binary file and can transfer it to another disk. Other utilities include Shape Capture, which converts any part of a high-resolution graphics screen into a shape; and Shape Screen Start, which lets you edit shapes created with another graphics utility.

This isn't just a package for hobbyists. *The Graphics Magician* is used to create graphics in dozens of commercial games and software packages. Since *The Graphics Magician* is available for several different machines, most of the work done on one machine can be easily transferred to another.

The Graphics Magician is unprotected and listable, allowing you to modify it as necessary. The documentation is extensive and includes one of the most readable explanations of Apple graphics I have seen. This is understandable, given the author of *The Graphics Magician*. Mark Pelczarski is one of the best known names in Apple graphics.

Picture Writer

When I saw this in my office mailbox, I thought, "Oh no! Not another bad educational package. Maybe Betsy won't remember she assigned it to me..."

Unfortunately, some of the educational software available today is terrible. The tell-tale signs are: block lettering, "artsy" covers, specially designed packaging, and a tutorial featuring more music and enthusiasm than Schiller's "Ode to Joy!" Well, *Picture Writer* has all of these, but it is not swill. In fact, *Picture Writer* is an excellent choice when you want to free your seven-year-old from Pacmania. This package delivers more than it promises. Scarborough Systems describes *Picture Writer* as software for drawing pictures, playing with pictures, and learning by drawing. It succeeds on all counts.

The *Picture Writer* work area consists of a clean page with a strip of icons and colors at the left. Although the icons are

supposed to be recognizable, they can be confusing. Zap (erase) looks like a lightning bolt, but it can be confused with the icon for Redraw, a squiggly arrow.

Selection is via the keyboard. For example, suppose you wish to color an area blue and orange. Press C for color and the two appropriate color numbers. For one solid color, enter the corresponding number twice. The area where the cursor tip rests is immediately colored in.

The cursor is an interesting feature. Two crosses represent the cursor. One is the cursor tip; the other is the cursor base. The distance between the two can be adjusted with the < and > keys. At first, this feature was an annoyance. As I used *Picture Writer*, however, I began to realize how useful this type of cursor can be when doing fine detail. An editing

Doublestuff is an extension to Applesoft Basic that allows the creation of double low- and high-resolution graphics.

feature permits the retracing of each drawing step to see where you have been and to redraw if necessary.

A music mode provides a note for each step in the drawing. This can be toggled on and off. It isn't a necessity, but it can be used to prompt a child for input. Each type of movement and color has its own sound. Though not a full-fledged music generator, this mode can be fun to experiment with.

Picture Writer is packaged in a clear plastic box that doubles as an easel for the manual or command card. The command card is well-written and printed in

large type. Finally, *Picture Writer* is unprotected. Any copy program will back it up. If you have ever had apple juice spilled on a disk, you know how helpful this can be. Scarborough Systems recommends *Picture Writer* for ages 5 through 15. I think 15-year-olds may find it a bit too elementary. The 5- to 7-year-olds who tested *Picture Writer* for us had a great deal of fun creating their own pictures and modifying those included on the disk.

Most educational software relies on the "drill and practice" method of teaching. I guess that is fine for some types of learning. *Picture Writer* is different; it doesn't talk down to children. It treats them as equal partners in the learning process. And because of this and the way it is written, I don't think a child will grow bored with it. If you are tired of buying "twitch" games that are discarded after a few weeks or "educational" packages that put your child to sleep, try *Picture Writer*.

Doublestuff

First off, *Doublestuff* is not a graphics package. It won't create shape tables, animate shapes, or quickly create high resolution pictures. *Doublestuff* is an extension to Applesoft Basic that allows the creation of double low and high resolution graphics. It allows you to run all Applesoft Basic programs with double-resolution graphics.

Doublestuff loads into the same memory area as Integer Basic, yet is fully compatible with every Applesoft Basic command. Moving between Applesoft and *Doublestuff* is as easy as moving between Integer and Applesoft. Just type DFP at the prompt to enter *Doublestuff*.

To use the new graphics features, you must have an Apple IIe and an 80-column extended memory card. Pins 50 and 55 on the card *must* be connected. Apple usually packages the card with the pins connected. If they are not, take the small blue connector packaged with the card and follow the directions that come with the card.

Double low-resolution graphics works the same way as normal low-resolution except that it operates next to the 80-column text portions of memory. What you get is an 80 x 48 matrix with 16 colors available.

Double high-resolution graphics are different, since they take place in a separate portion of memory. Normal high-resolution graphics consist of 280 x 192 pixels. Each pixel is made up of 8 bits (1 byte). Only seven pixels show on the screen for any pixel. The last bit is called the high bit and shifts the pixel to alter the color. With double high-resolution graphics, the screen is 560 x 192 pixels.



Picture Writer, a complete scene with menu at right.

creative computing

SOFTWARE PROFILE

Name: Picture Writer

Type: Picture creator

System: 64K Apple II, II+, IIe

Format: Disk

Language: Applesoft, machine language, and GraForth

Summary: An excellent choice for a child. Easy and fun.

Price: \$39.95

Manufacturer:

Scarborough Systems
25 North Broadway
Tarrytown, NY 10591

*The beauty ... the fascination ... the romance
of all the world's gemstones ...*

Gemstones of the World

*The Franklin Mint presents a complete and comprehensive collection
of the world's gemstones, each beautifully set into a solid sterling silver mounting.*

Available only by direct subscription.
The accompanying application
should be mailed by March 31, 1984.

Since the dawn of history, men have been intrigued ... fascinated ... even obsessed by precious stones. And no wonder! For each of the world's gemstones has been endowed by Nature with its own irresistible allure, its own inimitable magic. The bewitching radiance of the Diamond, ablaze with inextinguishable fires. The rich red flame of the Ruby ... the compelling blue of the Sapphire ... the extraordinary brilliance of the Emerald ...

Now, you have the unique opportunity to experience—and explore for yourself—the full richness and diversity of the kingdom of the gemstone. For The Franklin Mint has brought together in a single collection exquisite specimens of all the world's most treasured gemstones. The collection will bring you 63 different gemstones—every one of those traditionally used in creating fine jewelry, from Diamond to Moonstone, Topaz to Lapis Lazuli.

Each gemstone will be set into a solid sterling silver mounting. And displayed upon the silver, in rich frosted relief, will be an outline map identifying the country from which the principal deposits of that gemstone derive. Thus, the sumptuous red Ruby will be set against a map of Thailand, Amethyst will be identified with India, and Moss Agate with the United States. In addition, the reverse of each silver mounting will bear both the name of the gemstone it holds and data on its geological properties.

To enhance your pleasure still more, each issue will be accompanied by an authoritative commentary written by Dr. Peter Bancroft, one of the world's foremost gemologists.

Further, because this is the *definitive* collection of the world's most coveted gemstones, it will include not only the classics known to all of us, but others most familiar to jewelers and experts—Citrine, Chalcedony and Rhodonite among them. The result: a collection that will be a source of endless delight and satisfaction to the entire family.



As a subscriber, you will be able to build your collection at the convenient rate of one gemstone each month. The price for each gemstone in its silver mounting is just \$19, and this will be *guaranteed* for every issue, regardless of any rise in the cost of gemstones or of silver.

Gemstones of the World is a comprehensive, educational and beautiful collection comprising all 63 of the treasured gemstones traditionally used in creating fine jewelry. And to subscribe, you need send no payment now. Simply sign and return the accompanying application by March 31, 1984.



A custom-designed display case will be provided to the subscriber as part of the collection.

© 1984 FM

SUBSCRIPTION APPLICATION

GEMSTONES OF THE WORLD

Please mail by March 31, 1984.

The Franklin Mint
Franklin Center, PA 19091

Please enter my subscription for Gemstones of the World, consisting of sixty-three different gemstones, each set into its own sterling silver mounting, to be issued to me at the rate of one per month. A custom-designed collector's case, and reference material for each gemstone, will be provided to me as part of my collection.

I need send no payment now. I will be billed at the guaranteed issue price of \$19.* for each gemstone in advance of its shipment.

**Plus my state sales tax.*

Signature _____

ALL APPLICATIONS ARE SUBJECT TO ACCEPTANCE.

Mr.

Mrs.

Miss

PLEASE PRINT CLEARLY

Address _____

City _____

State, Zip _____



Doublestuff.

Again, each pixel is 8 bits. The difference is that the high bit does not control the color or the shift. This gives a more precise control over colors. There are four prime colors in the double high-resolution mode. By combining them, it is possible to get 16 colors.

No special commands must be memorized to use *Doublestuff*. All Applesoft commands are valid. The only differences are the X values when entering a graphics command. For example, when using normal low-resolution graphics, PLOT 39, 47 represents the highest values available. With *Doublestuff* PLOT 79, 47 is valid. The only drawback with these new graphics is that the X-axis is doubled while the Y-


axis remains the same. That isn't a fault of *Doublestuff*, but a limitation of the 80-column card. Still, as the examples show, the graphics are striking.

Doublestuff comes with a short manual and a reference card which explains the difference between normal and double graphics. The disk is not copy-protected. The sample programs are listable for examination and modification. You don't need *Doublestuff* to do double low-



Doublestuff.

and high-resolution graphics. The instructions for doing it have been published elsewhere. *Doublestuff* just makes the process easier by taking the instructions and appending them to Applesoft. So, instead of loading a program to call these special graphics, *Doublestuff* keeps them in memory for you. All you have to do is toggle between the two modes.

These are just some of the graphics packages available for the Apple. I think they represent some of the best of what is available. Each has unique features that others don't have. Which one you should buy depends on what type of graphics you plan to do. One thing they all have in common is that they make Apple graphics a much easier task. 

creative computing

SOFTWARE PROFILE

Name: Doublestuff

Type: Graphics utility

System: Apple IIe with 80-column extended memory card

Format: Disk

Language: Applesoft and machine language

Summary: Amazing! Double graphics made easy.

Price: \$39.95

Manufacturer:

Doublestuff Software
Development, Inc.
2053 W. 11th St.
Brooklyn, NY 11223

RUN "CAXES"
I/O ERROR
Disk Media Error

A Modern Day Fable (Abridged)

Once upon a time there was a very diligent man, Jack. One sunny day, he traded in his family cow for a new computer on which to do his taxes. At tax time, Jack ran his data file but alas, his CRT proclaimed "I/O ERROR." Then entered his neighbor carrying the Discwasher® Clean Runner™ Interactive Drive Cleaner and told Jack "Preventive maintenance will destroy dirt in the disk drive and keep it running clean." With a clean drive, Jack's taxes ran perfectly. The moral of the story: Discwasher Clean Runner is a disk of prevention for a bit of frustration.

The End

Not all endings are that happy. A dirty read/write head can cost not only many hours of time but also the loss of valuable data.

- Discwasher® Clean Runner™ Interactive Drive Cleaner is one disk that contains both the program software and the cleaning surface. There is no program to enter.
- Clean Runner is an interactive system. It responds to your individual entries as it leads you step-by-step through the cleaning process.
- Clean Runner directs the head(s) of your drive to a different track for each cleaning. Clean Runner provides a contamination-free cleaning surface.
- Clean Runner effectively works on both single or double-sided drives.
- Clean Runner is programmed for 20 cleaning operations.



A Disk Of Prevention For A Bit Of Frustration

discwasher

1407 North Providence Road P.O. Box 6021, Dept. CC, Columbia, MO 65205 USA A DIVISION OF JENSEN an ESMARK Company

Introducing
the first word processor
made especially for the home

HOMESWORDTM

The Personal Word Processor

1. A POWERFUL WORD PROCESSOR

- * helps you be the best writer you can be
- * at a fraction of the price of most others

2. EASY TO LEARN

- * audio cassette guide to the basics
- * instructions written in plain English

3. EASY TO USE

- * pictures illustrate your choices

VISUAL
MENU

TYPING AREA



HomeWord makes writing easy. Changing what you write is even easier. Since the commands are illustrated right on the screen, you don't have to memorize any complex codes.

Yet HomeWord's simplicity is deceptive. Although easier to use, it offers you the power of more expensive word processors!

Yes, HomeWord is the best buy for your money... and the best money can buy! HomeWord is available for only \$69.95 on the Apple II, II+, IIe and Commodore 64. Coming soon on the Atari!

Features Include

- | | |
|----------------------------------------------------|--------------------------------------------|
| * add, move and erase blocks of text | * automatic page numbering |
| * automatic outline indents | * print documents of unlimited length |
| * underline, boldface, upper and lower case | * universal search and replace |
| * reliable storage and retrieval of all your files | * easy view of movement through your files |

ENTIRE PAGE
DISPLAY



Inside Apple

Vol. 1, No. 4

A dot matrix printer that will improve your image.

Meet the Apple® Imagewriter, the newest dot matrix printer for your Apple Personal Computer.

And with all that it has going for it, just maybe the best dot matrix printer on the market.

Take legibility, for instance.

The Imagewriter crams 140 x 160 dots into each square inch. So you get text that's highly readable and high resolution graphics, besides.

And is it fast.

The Imagewriter cruises at an unbelievable 120 characters per second. And that's just in the text mode. It's even faster printing graphics. 180 characters per second, to be exact.

What's more, the graphics dump is up to 60% faster than other comparably priced dot matrix printers. And that makes the Imagewriter fast enough to handle the Lisa™

Yet it's just as at home with an Apple III or Apple IIe. Thanks to Apple software experts who designed the control electronics to give the Imagewriter perfect compatibility. Not to mention some special capabilities

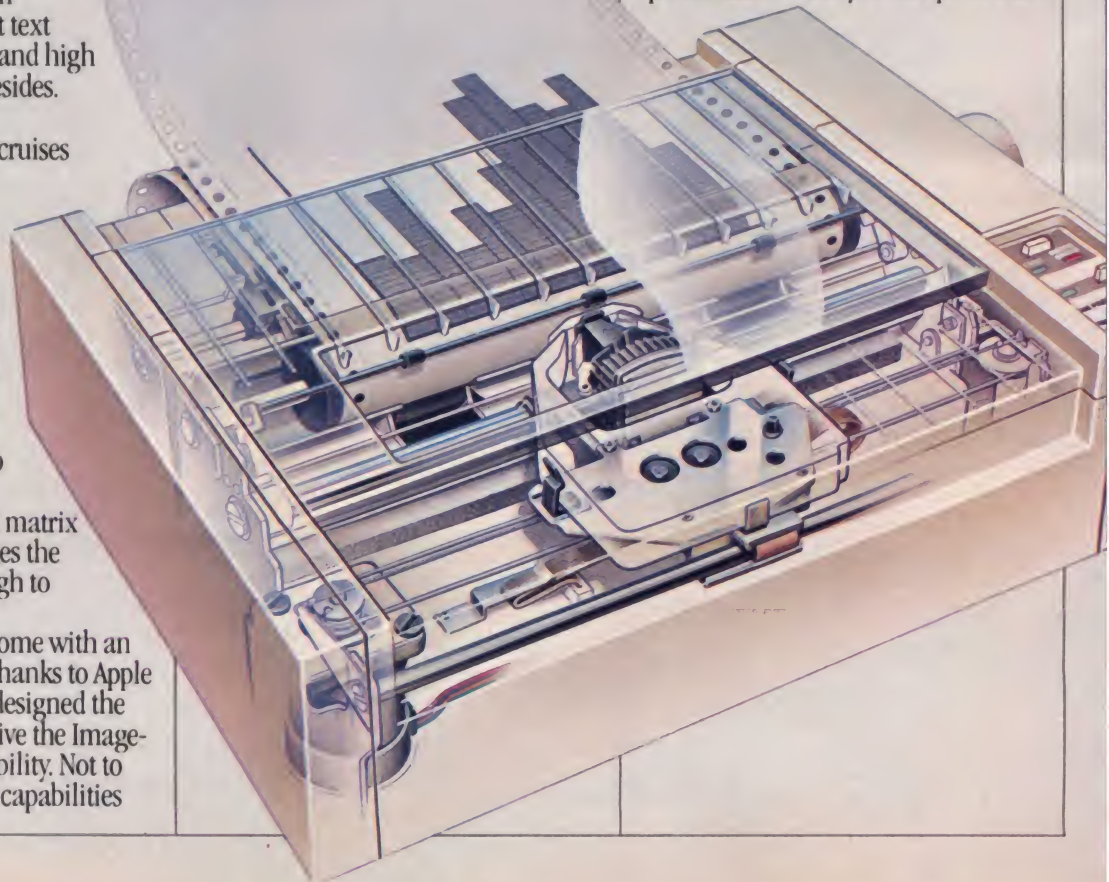
like superscript and subscript, to name just two.

Now, with all this high-speed performance, you'd expect the Imagewriter to make the Devil's Own Noise. It doesn't. In fact, the Imagewriter is specially constructed — with overlaid seams and special sound-deadening materials — to achieve a remarkable 53 dB. How loud is a remarkable 53 dB? You'd make more noise if you read this aloud.

The Imagewriter even has quiet good looks, since we designed it to look like the rest of the Apple Family.

Yet even with all its improvements, the Imagewriter is a better deal than any other dot matrix printer with comparable performance. And you can print that.

**APPLE PRESENTS THE
E IMAGewriter APPLE PR
ESENTS THE IMAGewriter APPLE PRESENT
S THE IMAGewriter APPLE PRESENTS THE IMAGewriter APPLE**





Charge!

Go out there and get the Apple Personal Computer System you really want. Now. Without laying out your extra cash. Without tying up your other lines of credit. With the Apple Card. The only consumer credit card reserved exclusively for the purchase of Apple Computers, peripherals and software.

Like all our products, it works simply:

Fill out an application (short, to the point and annotated in English) at an authorized Apple dealer honoring the Card. Your salesperson will call in the application and in most cases get an approval for you right on the spot.

You can then take your Apple system home. You don't even have to wait for the Card; we'll mail it out to you. And by the time you get it, you'll probably be well into doing whatever you bought your Apple system to do.

There is no annual fee for the Card, although a couple of restrictions do apply. The first purchase must include an Apple Personal Computer and you have to put 10% down. And subsequent purchases need to be at least \$100 if made with the Card. Oh, yes — you'll also have a credit limit.

When you use the Apple Card to make additional purchases, all you have to do is show the Card and sign the invoice. As long as it's within your credit limit, of course. Our dealers get a little nervous when someone signs for half their inventory. You understand.

You'll also receive monthly statements that include the latest purchases, credit available, and the minimum payment due. You'll also be happy to know Apple Card credit terms are affordable and the payments can be spread out. It's all

spelled out for you at the time your Card is approved.

So stop by a participating authorized Apple dealer and get an Apple Card. Just think of it as credit where credit is due.

Give your floppy disks the boot.

We call it the "floppy disk shuffle." It happens when you have two or more software programs on floppies and you need to work with both. What do you do? You put one disk in, boot it, do your work, take it out, put the other disk in, boot it, do your work — you get the idea.

Well, you can stop shuffling any time now.

Thanks to a unique new software program called Catalyst™ from Quark, Inc. Specially designed for your Apple III and ProFile™ hard disk.

Catalyst allows you to take a wide variety of software programs and store them on your ProFile. Once they're on your ProFile, you just select the program you want from the Catalyst menu that appears on your monitor — then Catalyst does the rest. You'll never have to boot those programs again.

What kinds of programs will work with ProFile and Catalyst?

Almost anything written for the Apple III including copy-protected programs like VisiCalc®, Quick File™ and Apple Writer III. Or languages like Pascal, BASIC, or COBOL.

And once you've loaded these programs into your ProFile, the only diskette you may ever need is the Catalyst.

So if you have an Apple III and a ProFile and more floppies than you care to flip through, get yourself a Catalyst. And boot those disks for good.



FIRST CLASS SOFTWARE

THAT TAKES YOU SOMEWHERE AND GIVES YOU SOMETHING SPECIAL

AGENT 2.0

AGENT 2.0 A crisis, real or imagined? A spy, ours or theirs? A file, fact or fiction? You must decide.



Portfolio Manager

BLU CHIP PORTFOLIO MANAGER Your broker on a disk. Tracks your portfolio. A data base for investors--with spread-sheet capabilities.

THOTH

Action List Data Base Manager

THOTH Once advisor to the gods of Ancient Egypt. Now yours. The action list data base manager.

C TOOLS

C TOOLS A collection of our most useful C routines. Add flavor to your C programming and save time too.

易動 EDO

EDO Think straight but think fast. The game of many strategies where no strategy is sacred.

ST. HIPPO- LYTE'S WALL

ST. HIPPOLYTE'S WALL The challenge of the wall. Colorful. Ever-changing. Complex. Will you survive?

XOR

CORPORATION

See us at Softcon Booth #A1200

5421 OPPORTUNITY COURT

MINNETONKA, MN 55343

(612) 938-0005

CIRCLE 186 ON READER SERVICE CARD

Growing Up Literate

Part 3

Key Lingo

Not long ago (October 1983) we panned an educational game from Reader's Digest. We called *Chambers of Vocab* "a tedious maze game with little educational value," and concluded by saying that we expected a great deal more from a company bearing the venerable name of Reader's Digest.

In *Key Lingo* we found what we expected from that company: a challenging educational game set in an amusing format.

The eight-page documentation booklet begins with the tale that supposedly sets the stage for the game. Most of it is irrelevant to game play, but the key role played by a piece of "tanned penguin hide" shows that even employees of venerable institutions can have a sense of humour.

The remainder of the documentation is sketchy and serves primarily as a pointer to get you started with the much more detailed instructions on the disk. The

Betsy Staples

instructions for playing the game are not the best, but it took us only a few minutes of playing the game to catch on. Anyway, part of the challenge, as in any adventure game, is learning how to play.

***The islands have
unbearably corny
names such as
I Don't Care Atoll,
Exclamation Point,
and Saloon Lagoon.***

Getting Started

After you boot the disk, you choose from a menu which offers instructions, an opportunity to enter your own words, and three levels of play. After you choose your level, you may choose to go over the words with which you will be playing before you start the game.

At the beginning of each turn, the hi-res screen displays one quadrant of a map of the Sea of Words. The islands are not identified, and the only way to explore one is to land your ship on its beach. You control your little diamond shaped ship from the keyboard.

Concerning the control of the ship, we repeat the same comments and criticisms we leveled at *Chambers of Vocab*: N, E, S, and W may be nice mnemonic keys for controlling direction, but they are intuitively meaningless. The player engrossed in a "swashbuckling vocabulary game" should not have to stop and think which keys to

use each time he wants to move his boat. Nor should he have to depress that key 10 or 20 or more times to get from one island to the next. Since we are unaware of any educational benefit to be derived from repeated hammering of a keyboard, we are at a loss to explain why Reader's Digest refuses to make those control keys autorepeat.

The islands have unbearably corny names such as I Don't Care Atoll, Exclamation Point, and Saloon Lagoon, and each time you land on one, the computer displays an even cornier little rhyme. You may then see yet another rhyme:

We need a word.
If under your hatch
You've got a match
We'll fill your hold
With gifts as good as gold.

The hi-res screen changes again, and you see a sentence from which a word is missing. One of the words from your list will complete the sentence properly, but you may not have that word in your "hold." If you have the word and type it in correctly, you trade it for a pile of coconuts, the medium of exchange and scoring in the game. If you do not have the word and respond correctly that you do not, the penalty is a harbor tax of only five coconuts. You suffer a greater penalty



creative computing

SOFTWARE PROFILE

Name: Key Lingo

Type: Educational game

Suggested Age: 11 and up

System: 48K Apple II and IIe,
IBM PC

Format: Disk

Language: Forth-79

Summary: Vocabulary practice in an
adventure setting.

Price: \$39.95

Manufacturer:

Reader's Digest Services, Inc.
Microcomputer Software Division
Pleasantville, NY 10570
(800) 431-8800

Growing Up Literate, continued...

if you guess incorrectly.

Other islands offer an opportunity to purchase (for coconuts, of course) additional words, so you can buy a word you need and return to the proper island to trade it. A third type of island offers definitions for words at a price of 30 coconuts each.

When you have collected 1000 coconuts, you can search for Key Lingo and when you find it, buy a treasure map, a transaction which entitles you to play a hidden word game. You move around a matrix of letters in search of one of your vocabulary words—a bit anticlimactic.

The game may be played by from one to four players, but we found it much more interesting and effective when played solitaire. The multi-player version seemed somewhat pointless, providing neither serious competition nor encouragement to cooperate. The sound effects, which can be toggled on and off only at the very beginning of the game when the disk is first booted, are uninspiring.

At the end of the game, you have an opportunity to review the words you got wrong during play.

Adding Your Own Words

When you have mastered the 300 words on the game disk, you will discover that entering your own word list is simplicity itself. You don't even have to search for a formatted disk on which to save them; they are saved right on the program disk.

You can add eight words at a time by entering the word, a synonym, a 40-character definition, and a 60-character sample sentence. The only thing we found to be other than self-explanatory was the fact that the object word should be replaced by a dotted line in the sample sentence if it is to be used in the game. The program automatically capitalizes the first letter of the first word in your sample sentence, but does not allow capitalization anywhere else in the sentence. Punctuation marks may be used.

The first time we used edit mode, halfway through our list, the Apple keyboard took a vacation and would produce only capital letters—and those not related to the keys being pressed. We reset the computer and tried to play to see what the program would do with the partial list we had entered.

When we selected Personal Words for the level of the next game, we got *ten*, *11*, *twelve*, *thirteen*, *fourteen*, and *fifteen* for a list. We tried the warm-up exercise for that list, got definitions of the numbers—"ten is greater than 9"—along with sample sentences for the words we had entered—very strange. We never did figure out where those numbers came from.

The only consistently negative feature of edit mode is that adding new words erases your old ones, so you can work on

only eight new words at a time.

Summary

We hope Reader's Digest will redesign the control system for subsequent versions of this and other programs. Our only other significant complaint is one that probably can't be cured: because all screens are hires, there is an enormous amount of disk access with accompanying delays of as much as four seconds between screens. We got tired of waiting, and frequently found ourselves entering keystrokes before the machine was ready to accept them.

Key Lingo does justice to the name of Reader's Digest. The concept of the game is good and should keep vocabulary learners entranced for many hours. It is clearly a drill and practice, as opposed to teaching, exercise, but it does a good job of what it sets out to do, and could be used well in either home or classroom.

Watch Your Language

When software is neither very good nor very bad, it is difficult to know where to begin an evaluation of it. There are even times when one is tempted to begin with a discussion of the packaging. This seems to be one of those times.

What Part Do You Play? is a good drill to force students to examine and identify the parts of speech in context.

All of the programs in the NTS language arts series come in rigid plastic covered folders with a pocket for the disk and a pocket for the documentation. Each game on the disk has its own documentation card printed in brown ink on coated card stock.

The programs in the *Watch Your Language* package provide drills on nouns, verbs, adjectives, adverbs, and prepositions, a concept we wholeheartedly endorse. The presentation, however, is far from sparkling.

Person, Place, or Thing concentrates on the recognition of nouns in sentence context. As the program begins, you are offered a choice of three activities plus ending the program. The first option, Definitions and Explanations, explains the use and functions of nouns.

Does This Word Qualify, the second option, displays one of 20 sentences. Beneath the sentence, one of the words that comprise it is displayed, and you are asked whether or not that word is used as a noun in that sentence. If you answer

correctly, the word CORRECT appears on the screen; if your answer is incorrect, you see the message YES, IT IS or NO, IT IS NOT.

The third option, Find Them All, displays the 20 sentences one at a time and asks you to identify all the nouns by typing them alongside the numbers that appear beneath the sentence. Find Them All is a good exercise which could have been made much better by building in a bit of forgiveness. If you make a typing error and discover it after you have pressed ENTER, you can forget making corrections. You can re-enter the word correctly, but the incorrect one will still be counted against you.

The programs that drill verbs, adverbs, adjectives, and prepositions function in exactly the same way. Moreover, this sameness carries over to their instruction cards which all contain the same typographical error.

The best program on the disk is What Part Do You Play? which drills all of the parts of speech practiced in the other programs. One of 20 sentences appears on the screen with one of its component words displayed under it. The program then asks WHICH PART OF SPEECH IS THIS WORD? and offers numbered choices. You must choose the number that corresponds to the correct part of speech. If you choose correctly, the word CORRECT appears on the screen; otherwise, you are given the correct answer.

What Part Do You Play? is a good drill to force students to examine and identify the parts of speech in context. It is, however, severely limited, as are the other programs on the disk, by the lack of ability to add your own sentences. As we have said before, we feel strongly that educational programs should provide this ability in the simplest possible form.

Watch Your Language rates a B, primarily because it recognizes the importance of learning the parts of speech. The execution is adequate, if uninspiring, but at

creative computing

SOFTWARE PROFILE

Name: Watch Your Language

Type: Educational drill and practice

System: TRS-80, Apple,
Commodore 64, Vic 20

Format: Disk

Summary: Practice identifying parts
of speech; overpriced.

Price: \$149

Manufacturer:

NTS Software
211 S. Orange Ave.
Rialto, CA 92376
(714) 875-2968



QUESTRON

Live the Fantasy and the Adventure.

STRATEGIC SIMULATIONS INC. PRESENTS A FANTASY ADVENTURE GAME: QUESTRON™
ONE OF THE FINEST CHAPTERS IN THE NEVER-ENDING SAGA OF THE BATTLE BETWEEN GOOD AND EVIL

Starring YOU as THE HERO • MESRON, THE GOOD WIZARD • MANTOR, THE EVIL SORCEROR

AND HIS HORDES OF HERO-CRUNCHING MONSTERS • Written and directed by CHARLES DOUGHERTY

ON 48K DISK FOR YOUR APPLE® II WITH APPLESOFT ROM CARD, APPLE II+, IIe, OR APPLE III. ALSO FOR ATARI® HOME COMPUTERS.

**APPLE® version now showing at a
computer/software or game store near
you. ATARI® version coming Spring 1984.**



PG

THIS GAME RATED POSITIVELY GREAT.
Ideal for Fantasy Adventurers of all ages.

APPLE is a registered trademark of Apple Computer, Inc.

STRATEGIC SIMULATIONS INC

ATARI is a registered trademark of Atari, Inc.

If there are no convenient stores near you, VISA & Mastercard holders can order direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. QUESTRON™ goes for \$49.95, plus \$2.00 for shipping and handling.

To order by mail, send your check to: STRATEGIC SIMULATIONS INC, 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043. (California residents, add 6.5% sales tax.) All our games carry a "14-day satisfaction or your money back" guarantee.

WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

CIRCLE 168 ON READER SERVICE CARD



ChivalryTM is alive!

ChivalryTM saves the day! Just when all computer games have started to seem the same, here's a thrilling new twist – software matched up with an exciting boardgame!

There's nothing else like Chivalry! Every step on the big colorful gameboard, and the action-packed on-screen adventures that result, depends on your skill and luck...and your opponents!

Beware! You'll be confronted with challenges requiring the skills of a master gamesplayer as you battle against such formidable scoundrels as thieves, witches, trolls and dragons – in 20 breathtaking arcade-style computer games for the Apple.[®]

Families love playing this game over and over! No two games are alike as you

strive against all odds to rescue the king from the evil black knight.

Young people delight in the humor, playability and colorful, fully-animated pictures. And grownups are challenged by the ex-

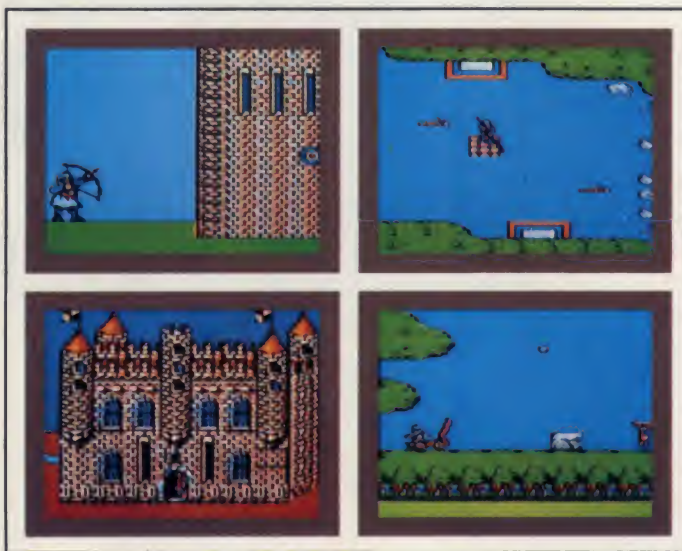
pert skills and wily strategy required to become a master Chivalry player.

Designed for 1 to 4 players, Chivalry includes a big, colorful gameboard, disk, playing pieces, a full-color poster, instructions and storage case. Only \$49.95.

Chivalry. The new software and gameboard adventure exclusively for the Apple!

Chivalry, by Richard Hefter and Steve and Janie Worthington, is a registered trademark of Optimum Resource, Inc. Apple and Apple II, IIe, II+ and III are registered trademarks of Apple Computer, Inc.

Developed by Optimum Resource, Inc. for Weekly Reader Family Software. Chivalry is available in finer computer stores everywhere. Or call toll-free: 1-800-852-5000, Dept. AC-3.



Weekly Reader Family Software

A division of Xerox Education Publications
Middletown, CT 06457

A/M28-C3

CIRCLE 185 ON READER SERVICE CARD

DRAWING YOUR OWN CONCLUSIONS



... Is Easy With The Versatile HIPAD™ DT-114 From Houston Instrument.

Enter a whole new universe of graphics, made possible by programs tailored to the HIPAD digitizer.

Exciting new applications in computer-aided drafting are now available, allowing you to create subdivision plats, machine drawings, schematics, architectural elevations and circuit-board artwork . . . with your micro-computer . . . at your desk . . . with no training as a draftsman.

Use of the HIPAD in medicine is increasing. With currently available software, physicians and dentists can prepare graphics of anatomical features for diagnosis and correction.

Artistic efforts are complemented by the HIPAD. With customized software, free-form renditions can be created quickly and precisely. Colors to fit the moment can be selected . . . and easily changed at a later time. The

HIPAD provides access to the realm of high technology graphics.

The HIPAD features a full-size 11" x 11" digitizing area, and is both UL listed and FCC approved.

The Conclusions You Draw Are Clearly Correct. The HIPAD will open the door to a universe of form and color . . . and creativity.

For the name, address and phone number of your nearest representative, write Houston Instrument, P.O. Box 15720, Austin, TX 78761. Phone 512-835-0900, or 800-531-5205 if outside Texas for the name and location of your nearest representative. In Europe contact Bausch & Lomb Belgium NV, Rochesterlaan 6, 8240 Gistel, Belgium. Tel. 059-27-74-45, Tlx. 846-81399.

houston instrument

HIPAD is a trademark of Houston Instrument

CIRCLE 194 ON READER SERVICE CARD

Growing Up Literate, continued...

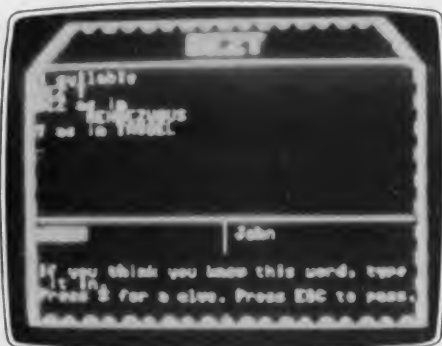
\$149 we cannot recommend the package as a good value.

We reviewed TRS-80 versions of the NTS programs. Given the greater graphics potential of the Apple and Commodore computers, we would expect a somewhat more exciting presentation of the material for those machines. We suggest that Apple and Commodore users ask for a demonstration before making a decision on the packages.

WordWorx

WordWorx from Reston Software is one of the few packages we have seen that makes effective use of the computer as a tool for teaching spelling, a skill that normally must be practiced by linking the spoken and written word. It does this in a rather roundabout but, we think, effective way.

The package includes two games, Myspellery and Sentence Maker, one on each side of the disk. Myspellery is the better of the two, and the one on which we will concentrate in this review.



creative computing

SOFTWARE PROFILE

Name: WordWorx

Type: Educational game

System: 48K Apple II or IIe

Format: Double sided disk

Summary: Challenging word game to stimulate reading and spelling skills.

Price: \$34.95

Manufacturer:

Reston Software
11480 Sunset Hills Rd.
Reston, VA 22090
(800) 336-0338

Myspellery

The game is based on the fact that many of the phonemes of which the English language is composed can be spelled in more than one way. The most famous

example of this is *ghoti*, which can be pronounced "fish" if you pronounce the gh as in cough, the o as in women, and the ti as in motion.

The game begins with a display of a word, such as ALYGHEARCEA at the top of the screen in hi-res capital letters. Two players can take turns guessing the word, or one player can take the turn of both players; there is no one-player option. The word is worth 100 points to the player who guesses it without having to ask for a clue. As each clue is revealed, the value of the word diminishes by 10 points.

In every case, the first clue tells the number of syllables in the word. The second clue tells you what they are: AL-Y-GH-EAR-CEA in the example above. These clues are seldom helpful and serve mainly to diminish your score. Subsequent clues get down to business by specifying, one-at-a-time, words in which the phonemes are pronounced as they are in the word you are trying to guess: AL as in alter, Y as in lynch, GH as in ghost, EAR as in hearth, C as in frolic, and EA as in beneath.

Myspellery is challenging and stimulating reading and spelling practice.

The first player to type the word correctly wins the number of points remaining in the countdown. Each round consists of six words, so a perfect score is 600 points—a total we saw only once in our playtesting.

Myspellery is challenging and stimulating reading and spelling practice. We like the idea of using old fashioned phonics to "sound out" words. Our only complaint is that there is no way to give up and learn the identity of a word that has you stumped. Not that we are quitters, mind you, but there was one word that we absolutely could not guess, even with all the clues uncovered. We "passed" twice in succession, and the game proceeded to the next word, but we never found out what the correct word was—and we still don't know.

Sentence Maker

Sentence Maker is considerably less inspiring than Myspellery. It requires you to concoct as many grammatically correct sentences as possible using a sequence of five initial letters. The existence of a secret sentence using the same five initial letters adds interest.

For example, from the letters E B C T W, you could create the sentence Every Beautiful Carrot Takes Walks. Your opponent could then type Elephants Bring

Cotton To Wales. Each of you would earn 25 points for your sentence. This exercise continues *ad nauseam* until someone stumbles on one of the words in the secret sentence. That word then becomes a permanent part of the construction, and you must use it in every sentence you make. You get to stop only when one of you guesses the entire secret sentence; in this case, Early Birds Catch The Worms.

There is probably some vocabulary building value in an exercise of this sort, and as in Mad Libs, some of the sentences were amusing—particularly to younger players—but for the most part, we became bored with Sentence Maker very quickly. We found ourselves desperately guessing every word we could think of without regard for syntax just so we could get the secret sentence and end the agony of playing the game.

We also noticed that touch typists were frustrated by the slow response to key-presses when they were typing their sentences. They frequently had to wait for the computer to catch up with their entries.

Adding Your Own Words

Adding new mysPELLeries and secret sentences is exceedingly simple. You merely choose File-Maker on the initial menu of the game, and the instructions lead you through the steps. You don't even need a second disk, as the new words are stored right on the program disk.

In the case of Myspellery, creating new words can be just as educational as playing the game, as you must specify not only the word and its alternate spelling but all the clues.

The games come with 150 words each, however, so unless there is something special you wish to practice, it will be a while before you master everything on the disk. In several hours of play, we did not encounter one duplicate word or sentence.

Documentation

The 16-page *WordWorx* instruction manual is as complete as it needs to be. For the most part, it simply elaborates slightly on the instructions on the disk. It does not provide any educational objectives.

Summary

We like Myspellery a great deal and think that it alone is worth the price of the package. We like to think of Sentence Maker as a bonus program that you can use if it strikes your fancy, but that you should not feel compelled to play to get your money's worth from the *WordWorx* disk.

In Myspellery Reston has done a good job combining a valuable exercise with an entertaining format that should be equally useful in home and classroom. **BB**

Product Preview: Microsoft Windows

23 Computer Manufacturers to Support New Operating Software System

Microsoft Windows is an extension to the Microsoft MS-DOS operating system that provides a universal operating environment for the new generation of bit-mapped application programs. Microsoft Windows will allow independent software vendors to develop sophisticated graphically-based integrated software packages that run without modification on any 16-bit microcomputer.

In addition to announcing the product, Microsoft announced that 23 personal computer manufacturers will offer Microsoft Windows with their systems, opening up a large market for software vendors who choose to develop programs based on the Microsoft Windows concept. These

manufacturers include: Altos, Apple/Rana, Burroughs, Bytec/Hyperion, Columbia Data Products, Compaq Computer Corporation, Computer Devices, Convergent, Data General, Digital, Eagle Computer, Hewlett-Packard, Honeywell, ITT XTRA, Mindset, NCR Corporation, Polo Microsystems, Radio Shack, Seequa Computer Corporation, TeleVideo, Texas Instruments, Wang Laboratories, and Zenith Data Systems.

In addition, Microsoft Windows features a window management capability that allows a user to view unrelated application programs simultaneously. Further, it provides the capability to transfer data from one application program to another. Micro-

soft Windows provides these advanced user interface capabilities for owners and purchasers of mid-priced 16-bit computers.

Portable Operating Environment

New application programs are using enhanced bit-mapped graphics and a mouse to improve the user interface of personal computers. When MS-DOS was originally developed in 1980, no allowances were made in the operating system to manage the interaction of these components of a computer system. To successfully use these hardware enhancements, application program developers have been writing programs that directly address hardware, a



When Windows is first loaded into a system, the display screen will have icons that represent the different application programs and a cursor arrow that can be moved about the screen by a mouse. The user activates an application program by moving the cursor arrow over an icon and pressing a button.



A word processing document is loaded into a window. Note how the window occupies the entire screen. The command menu for the word processing program can be found within the window. The remaining application programs are represented by the icons found on the lower portion of the screen.

complex, time-consuming task. This technique has significantly limited the number of computers that an application program could run on without extensive modifications.

Microsoft Windows is the first truly hardware independent operating environment for application programs.

Microsoft Windows will eliminate the necessity to write application software that directly addresses hardware by extending the functions of the MS-DOS operating system to include the management of bit-mapped screen graphics and mouse hardware. Consequently, a program that is written for Microsoft Windows will work on any system with the Microsoft Windows operating software.

"Microsoft Windows is the first truly hardware independent operating environment for application programs," said William H. Gates, chairman of the board of Microsoft. "Finally, microcomputer users will be able to take their software and plug it into any system, without worrying about compatibility."

This portability is designed to appeal to the software developers, who are expected to develop Microsoft Windows-compatible programs because they will not have to adapt software programs to each different microcomputer. Gates added, "Because of this universal appeal, we expect Microsoft Windows to become the dominant operating environment for integrated software packages that run on 16-bit microcomputers."

Simplified Computer To Human Interface

Microsoft Windows optimizes the bit-mapped graphics and mouse capabilities of a personal computer to provide an intuitive pictures-oriented user interface. This user interface can be customized by a software or hardware manufacturer to give each product its own unique look without sacrificing compatibility.

Application programs that are activated by Microsoft Windows will appear as one or more windows on the display. Any number of application programs can be displayed on a screen and the user can alternate between unrelated application programs without restarting the system.

Microsoft Windows does not overlap the different application windows. Instead, application programs are automatically positioned to fill the entire screen. Micro-



Three applications windows are now displayed on the screen. These include the word processing program, a graphics program and the MS-DOS interface. A sample of a drop down menu is shown in the graphics program.

soft calls this feature "tiling" and believes that it leads to more effective use of the display screen. Another feature of Microsoft Windows is "zooming," which allows the user to display an application program at the full size of the screen.

Microsoft Windows will be sold like MS-DOS, adding little or no cost to a system. The hardware requirements for

restore its environment and resume operation.

How It Works

There are two parts to Microsoft Windows, the window manager and the graphics device interface (GDI). The window manager draws the window for each client and manages the screen as a whole, using a technique called automatic window layout. The window manager is event-driven; it passes hardware-level events to its clients, and the clients supply procedures to be invoked in response.

The window manager also provides a library to user interface functions. The facilities included in this library are menus, property sheets, scroll bars, universal window commands, error handling, data interchange, and automatic window layout. To display its graphics-based interface features on a screen, the window manager calls the graphics device interface. The GDI can also be called directly from a Microsoft Windows client to generate graphics.

Virtual Interface To Graphics Devices

The GDI is a device-independent interface between a program and various output devices. The output devices may be vector or raster devices. The program may be an operating system extension, such as Microsoft Windows, or an application program, such as a spreadsheet or word processor. What the programs have in common is the need to draw images on devices and to be device-independent.

The GDI is designed around an "abstract device," which is the collection of all the functions that ultimately will be performed by the actual graphics devices. (For example, "draw a circle" or "change hatch

Microsoft Windows will be sold like MS-DOS, adding little or no cost to a system.

Microsoft Windows are: 192K bytes of random access memory, a mouse, two floppy disk drives and a bit-mapped display.

Running Existing MS-DOS Programs

Microsoft Windows will run all existing MS-DOS 2.0-based application programs although these programs will not be able to take advantage of the windows user interface or data exchange capabilities of the operating software. The operating software can recognize that the program is not a Microsoft Windows-based application and, after saving the state of the window's environment, will release control of the screen and hardware to the application program being started. Once the user has completed working with the non-windows program, Microsoft Windows will



Apple II compatible
64K of RAM

Upper & lowercase



Typewriter-style
keyboard



12-key numeric pad



VisiCalc keys



50-watt power supply



Built-in fan



1982



ACEWriter II

Sophisticated word processing that's easy to learn



ACECalc

VisiCalc®-compatible spreadsheet analysis
program with 80 columns of variable width



ACE Display card

Opens video display to a full 80 columns by
24 lines



ACE 80 CPU card

Allows you to run CP/M and Apple® II
programs



ACE Dual Interface card

Allows you to connect to local and remote
printers, terminals, computers and other
accessories



Apple II compatible
64K of RAM

Upper & lowercase



Typewriter-style
keyboard



12-key numeric pad



VisiCalc keys



50-watt power supply



Built-in fan

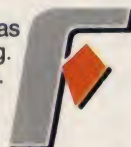


1983

Good. Better.
And you thought Franklin
was good before.

Well, look at Franklin now. You'll find our ACE product line has grown . . . and grown. To include sophisticated word processing. Sensational spreadsheet analysis. And an array of peripheral boards. So you can expand the capabilities of your ACE 1000 as your business needs increase. Our product line's not the only thing that's grown. Franklin now has more than 1,000 authorized dealers throughout the country. So, if you thought we were good before, come see us now.

Apple is a registered trademark of Apple Computer Inc.
VisiCalc is a registered trademark of Visi Corp.



FRANKLIN
COMPUTER CORPORATION

Better than ever.

2128 Route 38; Cherry Hill, NJ 08002 Telephone: 609-482-5900; Telex: 837-385

CIRCLE 164 ON READER SERVICE CARD

Microsoft Windows, continued...

style" would be functions for devices to perform.) When a function is called, the GDI takes the function parameters, in abstract-device terms, and passes them to a logical device driver. A logical device driver is the software that translates abstract device functions into a sequence of device-specific actions. These actions, communicated through a physical device driver, result in the appearance of graphics on the device. The only device-specific code is the physical device driver.

The language of the abstract device is made up of "primitives." The primitives are the calls to the graphics functions available at the lowest level of the GDI—the level of the logical device driver. The primitives may be expressed in any of the five high-level languages for which the GDI has language bindings (C, Basic Compiler, Fortran, Pascal, and Cobol). In the Microsoft GDI, there are over 90 primitives in four functional groups: control primitives, output primitives, attribute primitives, and inquiry primitives.

Microsoft Windows "calls itself" in that it uses the GDI to perform much of the display functionality it provides to clients. It is also quite legitimate for clients to call the GDI directly, especially to implement graphics for applications, such as business charting programs or mouse-based "drawing" programs. Because the graphics overhead is shared by all programs in the Microsoft Windows environment (including Microsoft Windows itself), the content and efficiency of individual application programs are enhanced. The Microsoft GDI meets the emerging ANSI-VDI standard for graphics interfaces.

Exchange Capabilities

Microsoft Windows' clients run independently of each other, but can exchange data even if their data structures are different. From the user interface point of view, data exchange means taking data from one window and inserting it into another window that is running a different application program. From the programming point of view, it means finding a common data type and interchange protocol between programs.

"Most of the application packages that are now described as 'integrated' can talk only to themselves," says Leo Nikora, marketing manager for Microsoft Windows. "The programs have the same data structure, and their exchange protocol is unique to that package. They can't exchange data with programs outside the package."

Microsoft Windows integrates independent application programs by putting the data exchange capability in the environment, rather than in the programs themselves. In its user interface library, Microsoft Windows provides an extensive set of predefined data types. These are "uninterpreted binary," ASCII "text," and

Microsoft's "SYLK."

Microsoft Windows supports two data interchange protocols. One is based on polling, in which one window periodically queries the contents of another. If polling is too expensive, a notification technique is also available by which clients express an interest in changes in other windows, and Microsoft Windows notifies them when a change has taken place.

Application programs can be designed specifically to cooperate with each other when exchanging data under Microsoft

Windows. The programmer can easily extend the set of data types to include types that add to the efficiency or effectiveness of the exchange. But the basic mechanism for data transfer is part of the Microsoft Windows environment. Without this mechanism, independent application programs would either be restricted to certain data types, or unable to communicate.

For more information, contact Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004. (206) 828-8080.

DRIVE CAREFULLY.

When you add disk drives to your system, be sure to get all the options you need; but don't pay for features you'll never use. Choose from a selection of Micro-Sci 5 1/4" floppy disk drives that includes everything from a low cost add-on to large capacity, high-speed subsystems right for the busiest office environment.

For Apple II® and IIe® systems, Micro-Sci's **Model A2** is a superbly crafted, 35-track drive which is completely compatible with all Apple II and Apple IIe hardware and software. It features a price tag its competitors envy. And the new **Model A82** from Micro-Sci combines a full 328K capacity—more than twice the space of a Disk II®—with the ability to read standard 35-track software.

For Apple III® systems, the **Model A3** offers all the features and capabilities

ties of the Disk III® at a fraction of the price. And at 286K, Micro-Sci's **Model A73** provides Apple III users with twice the capacity of the Disk III, and plugs right in to the built-in controller—no extra board or power cord!

Finally, the Micro-Sci **Model A143** is the largest 5 1/4" floppy disk storage system available for the Apple III 572K storage capacity and 5 msec access time make the A143 a powerful back-up device for hard disk systems.

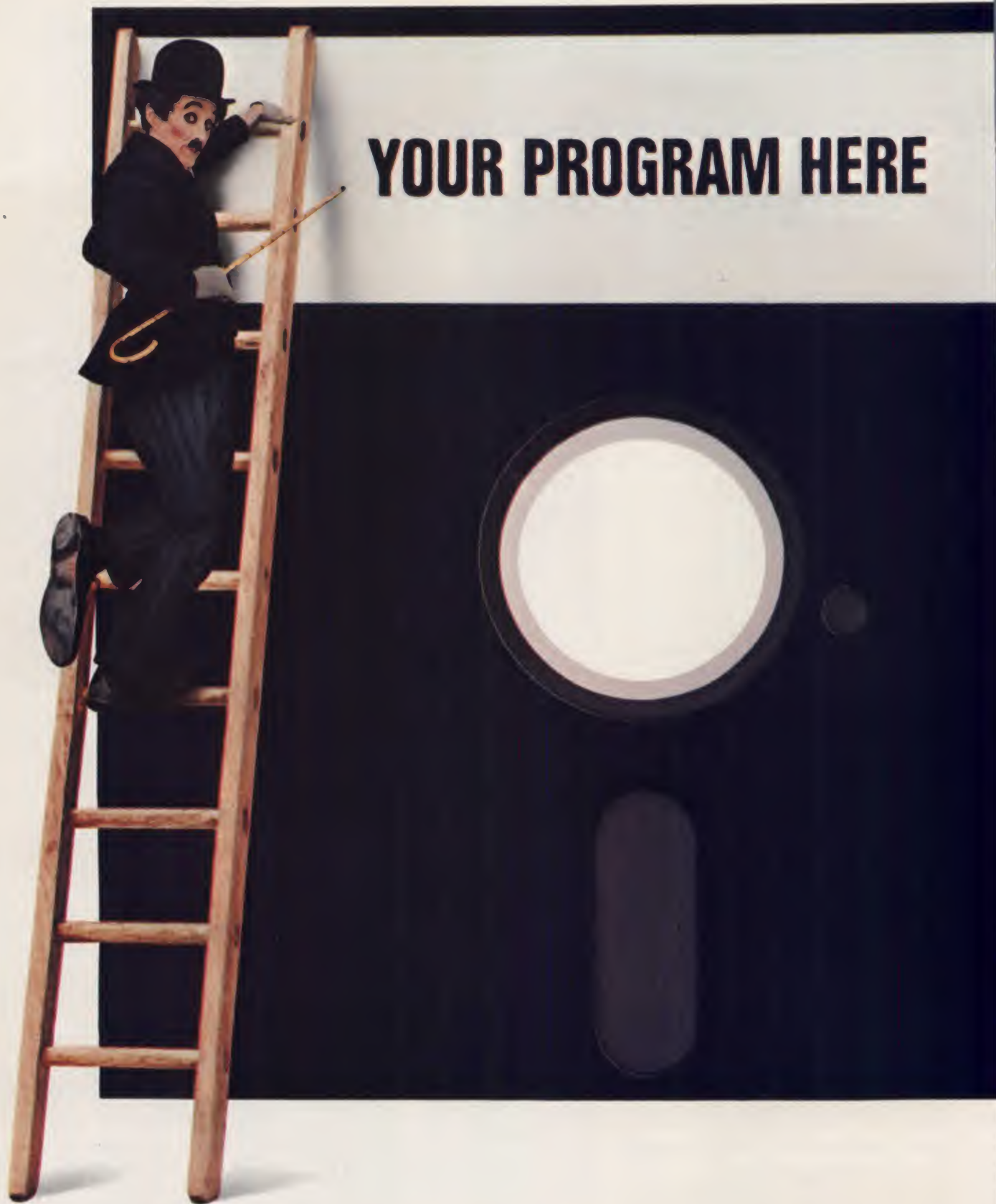
One option you'll never see on a Micro-Sci drive is a princely price tag—we control your costs as carefully as we control our quality. So drive carefully to your nearest computer center for a demonstration of Micro-Sci craftsmanship. Do it today!

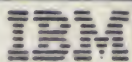


*Apple II, Apple IIe, Apple III, Disk II and Disk III are registered trademarks of Apple Computer Inc.

μ-SCI
MICRO-SCI

Micro Sci is a Division of Standun Controls Inc.
2158 S. Hathaway St. • Santa Ana, CA 92705 • (714) 662-2801 • TELEX: 910-346-6739





The best software for the IBM Personal Computer. Could it be yours?

Attention, all programmers. Here's a chance to reach the top.

If you've written software that's completed and runs on the IBM Personal Computer, we could be interested in publishing it.

(We also could be interested if it runs on *another* computer. If we select your software, we'll ask you to adapt it to our system.)

But be advised.

Our expectations are great.

Because the software we publish must be good enough to complement IBM Personal Computer hardware. In fact, the more you take advantage of all our hardware capabilities (see the box at right), the more interested in your software we become.

Think about incorporating color graphics into your program, for example.

Use sound. Consider the power of our keyboard and remember to utilize the ten programmable function keys.

In all cases, we're interested in "friendly" software—with emphasis on quality and wide appeal. Programs with the greatest chance of being published must be easy to use, offer a better way to accomplish a task and provide something special to the user.

What kinds of programs? All kinds.

Education. Entertainment. Personal finance. Data management. Self improvement. Games. Communications. And yes, business.

We select programs that will make the IBM Personal Computer an even more useful tool for modern times.

IBM PERSONAL COMPUTER SPECIFICATIONS

User Memory 64K-640K bytes	Display Screens Color or monochrome High-resolution 80 characters x 25 lines Upper and lower case	Permanent Memory (ROM) 40K bytes
Microprocessor 16-bit, 8088	Operating Systems DOS, UCSD p-System, CP/M-86†	Color/Graphics <i>Text mode:</i> 16 colors 256 characters and symbols in ROM <i>Graphics mode:</i> 4-color resolution: 320h x 200v Black & white resolution: 640h x 200v Simultaneous graphics & text capability
Auxiliary Memory 2 optional internal diskette drives, 5¼" 160KB/180KB or 320KB/360KB per diskette	Languages BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL	Communications RS-232-C interface SDLC, Asynchronous, Bisynchronous protocols Up to 9600 bits per second
Keyboard 83 keys, 6 ft. cord attaches to system unit 10 function keys 10-key numeric pad	Printer All-points-addressable graphics capability Bidirectional 80 characters/second 18 character styles 9 x 9 character matrix	
Diagnostics Power-on self testing Parity checking		

So, if you think your software is the best, consider submitting it. If it's accepted, we'll take care of the publishing, the marketing and the distribution. All you have to do is reap the benefits of our royalty terms. And you're free to market your program elsewhere *at any time* even if you license it to us.

We're offering the ladder. Think about taking the first step.

For information on how to submit your program, write: IBM Personal Computer,

External Submissions,
Dept. 765 PC, Armonk,
New York 10504.



The IBM Personal Computer A tool for modern times

For more information on where to buy the IBM Personal Computer, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.
†UCSD p-System is a trademark of the Regents of the University of California. CP/M-86 is a trademark of Digital Research, Inc.

CIRCLE 135 ON READER SERVICE CARD

BYTE GALLERY

John J. Anderson

Pixels, if you will. You're traveling through another dimension. A dimension of sight and of mind. A dimension not of brushes and oils, but of light pens and graphics tablets. At the signpost just ahead: a new form of artistic expression. A twilight zone, if you will, of artists and programmers, with the artists gaining fast.

The resulting works continue to improve, in style as well as sophistication. More artists have begun to think about the ways computers can create art.

Nor does it take a barrel of money to create great graphics anymore. All it takes is a machine like the Apple or Atari or Commodore 64, some graphics software, and an input peripheral. If you have a color printer or plotter, a whole new realm opens to you, but you may simply choose to pipe your final output to a TV screen and leave it at that.

If our magazine could show movies, what comes up ahead wouldn't be limited to mere stills. Next month a review will appear of *Movie Maker* for the

Atari, with which the user can create animated images. In the July 1983 issue of *Creative*, we reviewed *The Graphics Solution*, a similar program for the Apple micro, though it is a bit more complex. Both products offer an animation potential, which would otherwise require a good grasp on machine language, to the interested non-programmer.

In the realm of still graphics, artists are discovering that microcomputer generated images need not be limited to the clichés we have grown so weary of seeing. They are developing individual styles; styles that transcend the screens or printouts on which

Times Square. ©Peter Joselow 1983.

the works appear. Speaking as folks who have seen enough Lissajous curves to last a lifetime, we are overjoyed at this turn of events.

I don't consider myself any sort of computer artist, but I do know what I like, and I like the pictures that follow. All of them were generated on Apple, Commodore, or IBM computers with inexpensive graphics packages. We could have shown you works born of more sophisticated systems, but the idea here is to show off the lower end of the spectrum.

Bill Bramble

Bill Bramble works with an Apple and a KoalaPad, among other packages. His work shows an emergent and humor-filled style all his own. *Girl Watchers* is a good example of the playfulness of his vision, although I think I have seen those very characters on the corner of Washington Square and University Place.

Pre-Nova shows his ability with the



System Saver didn't become the Apple's number one selling* peripheral by being just a fan.

What made over 100,000 Apple® owners fall in love with System Saver? The answer is simple. It's the most versatile, most convenient, most useful peripheral ever made for the Apple.

System Saver filters out damaging AC line noise and power surges.

70-90% of all microcomputer malfunctions can be traced to power line problems.** Problems your System Saver guards against.

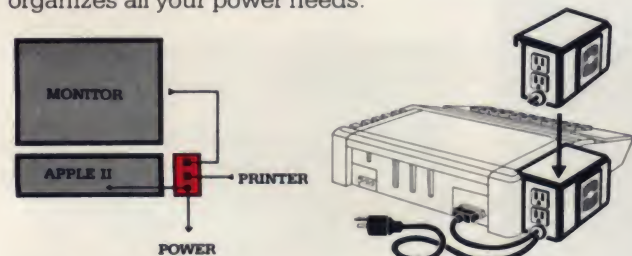
Power line noise can often be interpreted as data. This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing.

System Saver clips surges and spikes at a 130 Volts RMS/175 Volts dc level. A PI type filter attenuates common and transverse mode noise by a minimum of 30 dB from 600 kHz to 20 mHz with a maximum attenuation of 50 dB. You end up with an Apple that's more accurate, more efficient and more reliable.



System Saver makes your Apple more convenient to use.

No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.

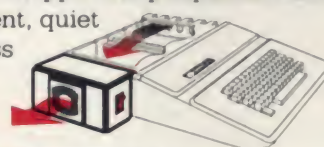


It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

System Saver lets your Apple keep its cool.

Today's advanced peripheral cards generate heat. In addition, the cards block any natural air flow through the Apple IIe creating high temperature conditions that shorten the life of the Apple and peripheral cards.

System Saver's efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots. It leaves your Apple cool, calm and running at top speed.



So if you want to keep damaging heat, line noise and power surges out of your system for good, pick up the only peripheral that's in use every second your computer is in use. The System Saver. You'll soon come to think of it as the piece Apple forgot.

Compatible with Apple stand



Please send _____ SYSTEM Saver(S), \$89.95 each Total \$_____

Include \$2.50 for shipping and handling.

New York State residents add applicable sales tax.

☐ Check enclosed ☐ Visa ☐ Master Card

Card No. _____ Expires _____

Name on Card _____

Name _____

Address (UPS delivery) _____

City _____ State _____ Zip _____ Phone _____

251 Park Avenue South
New York, NY 10010
486-7707 Tlx.: 236200 KEN UR

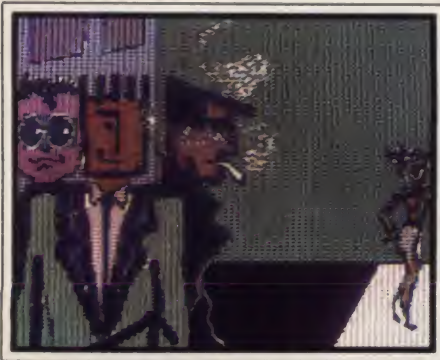
**KENSINGTON™
MICROWARE**

*Softel Computer Products Hot List. **PC Magazine: March 1983.

System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Available in 220/240 Volts, 50/60 Hz.

CIRCLE 170 ON READER SERVICE CARD

System Saver is a registered trademark of Kensington Microware Ltd.
© 1983 Kensington Microware Ltd. System Saver is patent pending.

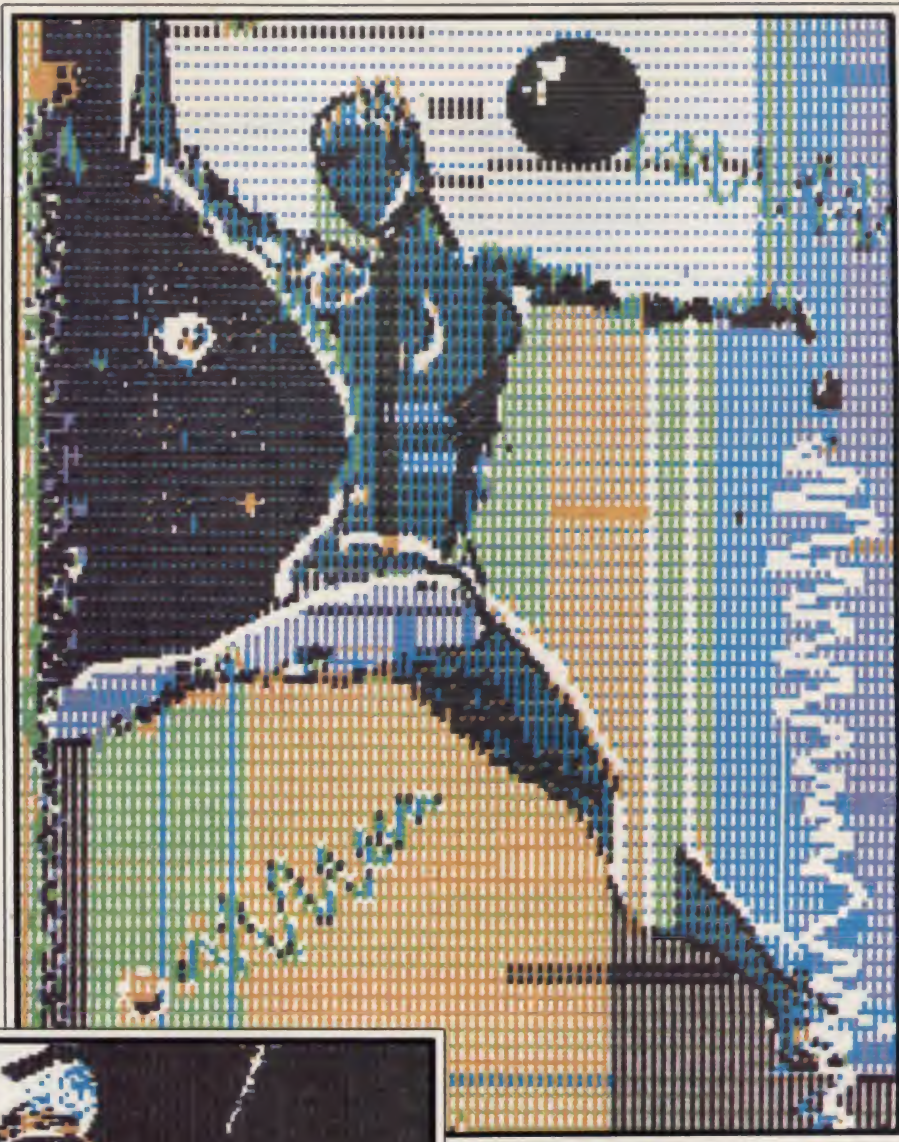


Girl Watchers. ©Bill Bramble 1983.

human figure, and is highly expressive, while evoking a strong feeling of three-dimensionality. *Galaxy Girl* and *Equinox No.1* indicate his mastery of the medium of the color printer. Color printers such as the IDS or the Transtar 315 have distinct and peculiar limitations, and I have been disappointed with some of my results with them. Bill seems to understand how to make those limitations work for him. *Galaxy Girl* has a clearly new wave feeling about it, a look which permeates much of Bill's work. *Equinox No.1* is the best original work I have seen which was designed specifically to be displayed as a color printout. Its feeling of movement manages to convey the emotions of physical exertion.

Peter Joselow

Peter Joselow also uses an Apple, and has been experimenting with the *Double-Stuff* system for the IIe. He used the



Equinox No 1. ©Bill Bramble 1983.

Doublestuff board to create the Times Square scene, which speaks for itself. The double hi-res capability of the Apple IIe transforms the Apple into a wholly new graphics machine. We look forward to seeing more from Peter as well as more Apple double hi-res stuff soon.

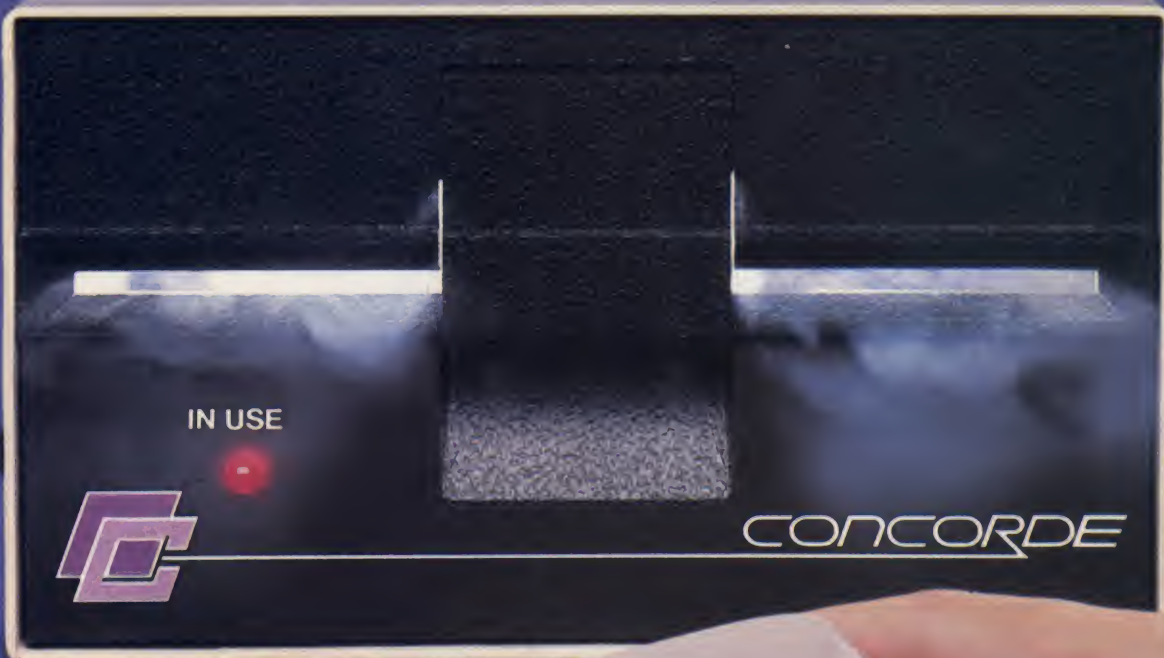


Pre-Nova. ©Bill Bramble 1983.



Galaxy Girl. ©Bill Bramble 1983.

MEMORABLE



CONCORDE

The new leader in the world of floppy disk drives introduces its new family of Apple® compatible drives with their own advanced electronics, quality drives with their own proven reliability and superior performance at a dramatic cost savings.

- CONCORDE Model C-111, Single Sided Disk Drive, gives you as much as 163K bytes of data storage... form, fit and function compatible with the Apple Disk II.
- CONCORDE Model C-112, Double Sided Disk Drive, with double the storage capacity, up to 326K, is the perfect subsystem for your Apple or Apple compatible computer.

Remember **CONCORDE!**
Check it out with your
favorite computer dealer,
or contact:

* Apple is a registered trademark
of Apple Computers Inc.



CONCORDE

CONCORDE PERIPHERAL SYSTEMS, INC.

[714] 859-2850

23152 Verdugo Drive
Laguna Hills, CA 92653

PaintPic

The *PaintPic* system for the Commodore 64 comes to us all the way from New

Zealand, and is a very capable package. The pictures GIGO, Storm on the Range, and Room, came along with the demo

package we received, but unfortunately had no artist's credit accompanying them. The only data we have are the mysterious initials D.J.R. to clue us in.

GIGO looks quite a bit like the main corridor of *Creative Computing* during renovation of the building. Room is just about the nicest composition I have seen on the C-64 to date.

Mike Sullivan

Mike Sullivan is a talented young artist currently working with ISM, the firm that markets the *Fun with Art* package through Epyx for all machines mentioned above. The pictures reproduced here were composed on an IBM PC. Mike has a sure and solid style, and a good grasp of the care and feeding of hi-res pixels. His portraiture is reminiscent of Saul Bernstein.

As for the future, well it is quite bright. Look for plotters to become more and more involved in artists' work, and software that allows for nested levels of detail. The Robographics CAD-1 system is such a package.

Look also for the composition of moving images to become more prevalent. The art gallery of tomorrow is a flat screen TV on your wall. Static images are fine, but perhaps best left to DaVinci and Raphael. Dynamic art is a natural for the computer—whether in real-time animation or the single-frame variety.

Look also for the trend to continue to add computer images to music video: another natural wedding. You might even imagine using your computer to create your own music, then creating the animated video to accompany it.

As I have asserted many times and in many forms, a (possibly *the*) great advantage of computer art is its ability to make *you* into the artist. If you have some original work that you think we should see, send it in. You may just make the next show in the Byte Gallery.

Pictures, if you will!

90



GIGO. ©Kiwisoft 1983.



Room. ©Kiwisoft 1983.



Pete Townshend. ©Mike Sullivan 1983.



Reggie Jackson. ©Mike Sullivan 1983.

An educational ad about educational software.

YOU studied all the computers and finally chose the one your family found most useful. One of the main reasons you wanted a computer in the first place is to help your children in school. Not just to teach them how to use a computer, but also to help them get good grades in basic school subjects like reading or geography.

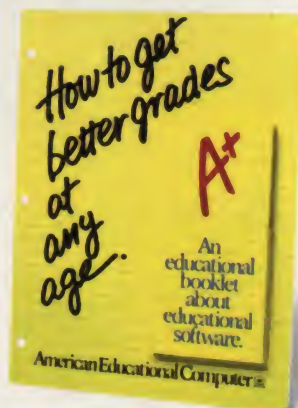
That's why you should know about AEC, American Educational Computer - one of the country's most important developers and publishers of educational software.

You can help your child all the way through school and beyond.



AEC grew up on education.

The management of AEC started in educational publishing, with collectively over 100 years of experience in the field. AEC knows curriculum and how American education is practiced in the classroom. That's important because children should learn at home the same way they learn at school. Otherwise, you'll have a very confused child, and confusion is not the way to better grades or better learning.



Look for our display in your favorite software store, and pick up your free educational leaflet.

AEC knows that good grades are important.

Any educational software could help school performance in some way. That's because the computer is such a patient teacher, giving instant feedback to questions and allowing children to learn at their own pace.

But AEC software has an important advantage. Our approach has been student tested under actual classroom conditions. So we know it keeps the child's interest while it teaches.

AEC gets parents involved in the learning process.

With either AEC's MATCHMAKER™ or EASYREADER™ Series, you can take your child through the grades in subjects such as Phonics, Word Attack Skills, Reading Comprehension, Spanish, World or US Geography, and Grammar. Our teacher tested system

allows parents to enter material into a lively, interactive format. And because AEC's programs are grade-level oriented, you can help your child all the way through school.

AEC doesn't play games with education.

AEC programs do contain games, but only as rewards for learning achievement. For example, once your child successfully completes the objective in the Matchmaker Geography program, he or she can play an exciting, action-packed game.



Sure, the games are fun. But they're not the basis, and certainly not the primary focus, of any AEC software. Our focus is strictly on learning. And isn't that what you buy educational software for? If you have more questions about educational software, contact your nearest AEC educational software center. And thanks for being a concerned parent.

A+

American Educational Computer

2450 Embarcadero Way, Palo Alto, CA 94303

All AEC Products are compatible with Apple, IBM® PC, Atari 800, TRS 80™ Color and Commodore 64™ Microcomputers. TM signifies manufacturer's trademark. © signifies manufacturer's registered trademark.

CIRCLE 102 ON READER SERVICE CARD



We don't care which computer you own. We'll help you get the most out of it.

**CompuServe puts
a world of information,
communications, and
entertainment at your
fingertips.**

CompuServe is the versatile, easy to use interactive videotex service designed especially for the personal computer user. It's dynamic, growing and changing daily to satisfy its subscribers' needs. It's an industry leader, created and managed by the same communications professionals who provide business information and network services to over one fourth of the FORTUNE 500 companies.



From current events to current assets, CompuServe offers a wealth of useful, profitable or just plain interesting information.

Electronic magazines and national news wires plus worldwide weather, current movie reviews, electronic banking and shop at home services, and some of the most sophisticated financial information available are

all offered to current subscribers.

From words to music. CompuServe offers a communications network that gives special

interest groups from hardware enthusiasts to computer composers a chance to get together. There's a bulletin board for selling, swapping, and personal notices and a CB simulator for real-time communications between subscribers. There's electronic mail, the fastest, surest, way to communicate with other users across the street or across the country, plus file retention and editing, and lots, lots more.



Fun and games are expected whenever computer users interact, and CompuServe has the best. Games you can play alone or with other CompuServe subscribers anywhere in the country. Classic puzzlers, sports and adventure games, and fantastic space games featuring MegaWars, the "ultimate computer conflict."

But, that's just the tip of the chip. CompuServe offers a menu of thousands of items that make subscribing educational, fun and sometimes downright profitable. If you'd like to know more about CompuServe, call toll free, 800-848-8199 to receive an illustrated guide to the CompuServe Information Service. A videotex service for you no matter which computer you own.



CompuServe

Consumer Information Service, P. O. Box 20212
5000 Arlington Centre Blvd., Columbus, OH 43220

800-848-8199

In Ohio call 614-457-0802

An H&R Block Company

CIRCLE 107 ON READER SERVICE CARD

apple *Fest*

SAN FRANCISCO

As you entered Applefest you found immediately in front of you the booth of, you guessed it, Apple Computer. Not much new to report there.

Apple certainly isn't writing off the Apple III as the financial press seems to have done. The available software for the III seems to have taken a major leap—or perhaps we just haven't kept up. Available packages include *The BPI General Accounting System*, *Senior Analyst* (a corporate planning tool), *VisiCalc*, *Quick File* (a comprehensive database manager), *Apple Writer*, *Apple Speller*, *Apple Business Graphics*, *Mail List Manager*, *Apple Access* (a communications package), *Apple Access 3270* (a 3270 emulator), *Micro/Courier* (electronic mail program), *Cobol* (yup, the real thing), *Business Basic*, *Pascal*, *Script III* (a formatting program), and a *Record Processing Services* package for Pascal users—pretty impressive lineup!

Some of the Apple II hardware has been repackaged in classier shells, but we have previously reported on all of it. *Business Week* may think that IBM has won the small computer battle; as for us, we think Apple has their act together as well as anyone in the industry and, far from writing them off, we think they will continue to be a major contender.

We're sure the 108 exhibitors and tens of thousands of showgoers agree. But enough prognosticating. Let's take a look at what is new in Appleland. When you write or call any of these manufacturers for further information or to place an order, please be sure to mention *Creative Computing*.

Would you like to make your Apple into a transportable? If so, consider the Portable 100 from **Portable Peripherals**. This is a conversion kit into which you transfer your motherboard, keyboard,

David H. Ahl

power supply, internal peripheral cards, and disk drives. A 9" amber monitor and fan are included in the \$395 price.

Portable Peripherals, 45 North First St., San Jose, CA 95103. (408) 945-8130.

Memory and Disk Systems

Axlon was attracting a great deal of attention with their RAMdisk system for the Apple. It is available in two models (128K for \$379 and 320K for \$999). In their demonstration, they were loading hi-res pictures from the disk nearly

as fast as they could be displayed on the screen (five slides per second). The RAMdisk is claimed to be up to 50 times faster than floppy drives and 10 times faster than hard disks.

Axlon, Inc., 70 Daggett Dr., San Jose, CA 95134. (408) 945-0500.

Hard disks seemed to be getting major attention at the show. A compact unit, the **Infax 101A**, stores 10Mb and uses a removable cartridge. This aspect means virtually unlimited storage capacity. Average access time is 35 msec. The included software supports DOS 3.3, Pascal, and CP/M. The first drive with controller costs \$2395, an additional drive is \$1595, and removable cartridges are \$70 each.



Portable 100 case.



Vufax hard disk unit has removable cartridge.

Vufax, Inc., 5301 Covington Hwy., Decatur, GA 30035. (404) 981-6778.

Another 10Mb hard disk is the **Trustor 10**. Unlike other units, it has a Xebec controller in the drive box, and uses small interface adapters for various computers (Apple, IBM, Compaq, Eagle, and Columbia). Average access time



Datamac 10Mb hard disk works with many computers.

is 85 msec. All standard operating systems are supported. \$2295.

Datamac, 432 Lakeside Dr., Sunnyvale, CA 94086. (408) 720-0800.

The **Densei RD-5000** hard disk is available in both 5Mb and 10Mb capacities. Average access time is 75 msec. The unit employs a Xebec controller and is available for Apple (DOS 3.3, Pascal, and CP/M), IBM (DOS 1.1), and TRS-80 Model III and 4. The 5Mb unit is priced at a modest \$1290.

Micro Storage Technology, 41711 Joy Rd., Canton Township, MI 48187. (313) 459-3822.

Not quite ready for a hard disk, but you want more floppy capacity? How about an 80-track double-density drive from **Micro-Sci**? The Micro-Sci A82 has considerably faster track to track access than the original equipment Apple drive

(5 msec vs. 18 msec) and 328K capacity compared to 143K. DOS 3.3, Pascal, and CP/M are all supported. The A82 can read all standard 35-track Apple disks. Price with controller is \$669.

Micro-Sci, 2158 S. Hathaway St., Santa Ana, CA 92705. (714) 662-2801.

Several manufacturers were showing Apple-compatible slimline floppy disk drives. The **TDS Micro Drives** come in single and dual configurations (side by side or stacked) and provide 35 or 40 tracks of storage. Their speed is impressive; the manufacturer claims that they are up to 800% faster than the standard Apple drives.

Titan Data Systems, Inc., 2625 S. Orange, Santa Ana, CA 92707. (714) 546-6355.

Advanced Micro Technology was showing a slimline disk drive for the Apple using a Panasonic mechanism. In capability it is identical to the Apple drive with 35 tracks and 140K capacity. The big difference is the size (about 1.5" high) and the low price. The show price was just \$185, which the manufacturer has agreed to extend to people who write and mention Applefest.

Advanced Micro Technology, 60 Connolly Parkway, Hamden, CT 06514. (800) 243-4335.

Prometheus and **Artsci** were sharing a booth to promote the combination of *Magicalc* and 128K Expand-A-Ram board. This is a great package for spreadsheet users who are pressed for memory space. Package price is \$499, a 10% savings over the individual components.

Prometheus was showing two other new products. The P/S Buffer card works with the II and IIe and allows parallel or serial printing (selected by software) while the computer is free to process, compute, or accept data. The 16K version is just \$125.

Prometheus had a new 1200-baud modem with a real-time clock/calendar and all kinds of intelligence built in. It has auto originate and answer, intelligent dialing, internal diagnostics, and a help mode. \$495.

Prometheus Products Inc., 45277 Fremont Blvd., Fremont, CA 94538. (415) 490-2370.

Magicalc from Artsci is a second-generation spreadsheet. It can use most 80-column boards, but alone can display either 40 or 70 columns. Advanced features include varying width columns, in-

visible cells or columns, automatic formatting, and a user-friendly menu system. \$149.95.

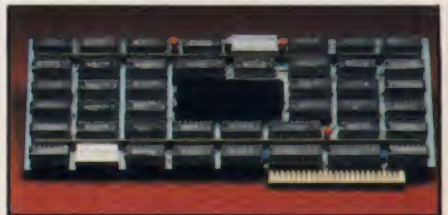
Artsci was showing several other packages in the Magic series. We were impressed with *Magic Window II*, successor to the original *Magic Window*. It shows the representation of a piece of paper on the screen just as you would see it in a typewriter—basically, what you see is what you get. The cursor motion and editing commands provide all we could imagine plus some of which we never dreamed. \$149.95.

Magicalc from Artsci is a second-generation spreadsheet.

Artsci, 5547 Stasuma Ave., North Hollywood, CA 91601. (213) 985-2922.

Add-On Boards

Titan Technologies (formerly Saturn Systems) was showing their line of Apple boards. Attracting much attention was the **Accelerator II**, a board said to speed up the internal speed of the Apple by a factor of 3½ times. We watched some massive *VisiCalc* applications run faster than we had imagined possible. The board has its own 6502 mpu, 64K of memory, and fast language card. It is said to be fully compatible with all existing software. List price is \$599.



Accelerator II from Titan makes the Apple 3½ times faster.

Titan also has a full line of add-on memory boards for the Apple (up to 128K) and IBM PC (up to 256K). They also have three extended 80-column boards with up to 192K of memory for the Apple IIe.

Titan Technologies, Inc., P.O. Box 8050, Ann Arbor, MI 48107. (313) 662-8542.

You say you like the speed and features of the Motorola 68000 mpu but have an Apple? **Analytical Engines** has a board, the Saybrook, a 32/16-bit co-

"I built this 16-bit computer and saved money. Learned a lot, too!"

Save now. Build the H-100 kit, a computer that will keep pace with technology for years to come.

Advanced 16-bit computing at a kit price! With most circuit boards already pre-wired, H-100 is our easiest computer kit. And our manuals ensure that "We won't let you fail!"

Dual microprocessors deliver 16-bit speed and 8-bit compatibility. The industry standard S-100 card slots allow a host of peripherals and memory expansion to 768K RAM.

A high-density (320K) 5.25" drive is standard. Powerful options include an internal multi-megabyte Winchester drive (available soon).

See the world's first 16-bit/8-bit computer kit, plus peripherals and

software... at your Heathkit Electronic Center.[†] Or mail the coupon today for a FREE Heathkit catalog!

H-100 SERIES COMPUTER SPECIFICATIONS:

USER MEMORY:
128K-768K bytes*

MICROPROCESSORS:
16-bit: 8088
8-bit: 8085

DISK STORAGE:
Built-in standard
5.25" disk drive,
320K bytes/disk

KEYBOARD:
Typewriter-style,
95 keys, 13
function keys,
18-key numeric pad

GRAPHICS:
Always in graphics mode.
640h/225v resolution;
up to eight colors
are available**

*128K bytes standard.
**Optional.

COMMUNICATIONS:
Two RS-232C Serial
Interface Ports and
one parallel port

DIAGNOSTICS:
Memory self-test
on power-up

AVAILABLE SOFTWARE:
Z-DOS (MS-DOS)
CP/M-85
Z-BASIC Language
Microsoft BASIC
Multiplan
SuperCalc
WordStar
MailMerge
Data Base
File Manager
Most standard
8-bit CP/M
Software

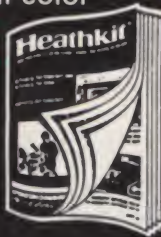
Buy from
the leader in
electronic kits
and save!

[†]Heathkit Electronic Centers are units of Veritechnology Electronics Corporation. Heath Company and Veritechnology Electronics Corporation are subsidiaries of Zenith Radio Corporation. CP/M is a registered trademark of Digital Research Corporation.

Get your full-color

FREE

Heathkit
Catalog!



Heathkit

CLIP COUPON AND MAIL TODAY TO:
Heath Company, Dept. 355-142
Benton Harbor, MI 49022

Please send my FREE Catalog,
with details on the new 16-bit/8-bit
H-100 Computer Kit, today!

Name _____

Address _____

City _____

State _____

CP-219R2

Zip _____

Applefest, continued...

processor which provides Apple users with the speed and power of a micro-mainframe with 128K of RAM (expandable to 512K). The board has the 8 MHz version of the 68000 which can be upgraded to 12.5 MHz for speed-critical applications. In addition, five on-board counter/timers provide a 24-hour time-of-day clock and operating system for multiprocessor support.

The Saybrook software includes the UCSD p-system for Pascal, Basic, Fortran-77, and 68000 assembler. CP/M-68K and UNIDOS (a Unix system) are available as options.

Analytical Engines, Inc., 3415 Greystone, Austin, TX 78731. (512) 346-8430.

Our friends at Quadram were showing their complete line of boards for the IBM PC (how come at an Apple show?) along with several Apple boards, buffers, and a new color monitor.

The latest Apple board is Multicore, a multifunction card designed to take advantage of ProDos, Apple's new operating system. Of course, it works with DOS 3.3 as well. The board has sockets for additional memory (up to 128K), parallel and serial ports, real-time clock, and RAMdisk software which allows you to use part of your total system memory as a disk drive. It is compatible with all software and replaces the Apple language card. Price is \$395 for the 64K version, \$495 for 128K.

Redicore is similar to Multicore but does not have the RAMdisk software; it comes in 0K, 16K and 64K versions with prices from \$249 to \$379.

Transcore is a board with serial or parallel printer interface, communications interface and menu-driven software for various I/O configurations. List price is \$199.

Quadram also has two nifty color boards for the IBM PC and XT, Quadcolor I and II which provide the same functions as the IBM color board with several extended features. Prices start at \$275. The Quadchrome color monitor is a high-quality RGB color monitor capable of 16 colors with 690 x 480 pixel resolution. Cost is \$695.

Quadram Corp., 4355 International Blvd., Norcross, GA 30093. (404) 923-6666.

Buffers and Interfaces

Of printer interface fame, Pkaso was showing a new universal parallel printer interface for the Apple II, IIe, and III. Seemingly, it does everything; with one command, it dumps text, low-res, and

Instant one-button color printing.



Press here.

It's just that easy! Any time you want to print what's on your Apple's screen just hit the copy button on your Transtar 315 color printer with our PICS card installed, and it's done! No special programming, no lengthy code sequences, no need to exit your program! Just press the button and it prints!

By adding the optional PICS card to your \$599 Transtar 315 color printer, you've opened up a whole new world of easy color printing. For the first time ever, our PICS parallel interface card enables you to screendump virtually any program -- graphics, charts, games -- even copy-protected software! Specially designed only for the Apple II, II+, IIe, and Franklin computers, the Transtar 315 PICS card does the work of a parallel card and a lot more and costs only \$119.95.

At the push of a button, Transtar's innovative new 4-color diagonal ribbon will print up to 7 colors and more than 30 shades in a single pass.

The 315 is precision-built to exacting standards by Seikosha, the most experienced company of the famous Seiko group-- recognized worldwide for quality and dependability. In fact, one of the nicest things about Transtar's 6-month warranty on parts and labor is that you'll probably never use it!

Innovative, inexpensive, dependable, easy: the Transtar 315. Color printing has never looked so good!

Only \$599.



*PICS cards are currently available for Apples and Franklins.
PICS cards for other computers will be available in the future.

Transtar

A Vivitar Computer Product

P.O. Box C-96975, Bellevue, WA 98009

CIRCLE 236 ON READER SERVICE CARD

National Conference on Technology and Education

Sponsored by:
The University of Texas at Austin
College of Education and
Tandy Corporation/Radio Shack
Education Division

Discover the impact of new technologies on the classroom. The National Conference on Technology and Education will be held April 19-20 in Fort Worth, Texas. The two-day conference is co-sponsored by the University of Texas at Austin College of Education and Tandy Corporation/Radio Shack Education Division. The conference will offer educational decision makers a forum to explore applications of computer technology as well as the potential benefits and problems of computer usage in education. Featured keynote speakers, breakout sessions dealing with topical issues, as well as demonstrations of

present technology will provide the most current information for concerned educators.

Explore the ways in which educators can effectively prepare today's schools and youth for the information age. Participants can attend sessions focusing on educational courseware, classroom networking, hardware and software purchasing considerations, computer curriculum planning, administrative courseware and teacher training. Educators will be able to select from these topics of interest and many more. An exhibit area will also be open each day to give participants "hands-on" demonstrations.

CIRCLE 156 ON READER SERVICE CARD

Receive credit for your efforts. To those who request it, a Continuing Education Credit Unit of 2.0 hours will be granted by the University of Texas College of Education upon completion of the conference. Those who wish, and whose districts approve, may receive "inservice training credits" for attendance. (An additional fee is required to receive CEUs.)

Take advantage of this unique opportunity. Plan to attend the National Conference on Technology and Education. Registration fee is \$95. Attendance is limited, so send for a registration form today.

To receive more information and registration materials, mail this completed form to:

The University of Texas at Austin, College of Education,
Continuing Education Program, EDB 374, Austin, Texas 78712

NAME _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____
SCHOOL/ORGANIZATION _____ POSITION _____ TELEPHONE _____

Applefest, continued...

hi-res images to both color and B&W printers. Moreover, it has the ability to print gray scales as found on digitized images. We were impressed with the capability to print on the printer three times the resolution that the computer itself is capable of displaying.

The Pkaso/U has many other features as well: margin control, user-definable macros, windowing print areas, stretched graphics in either direction, and a font system for design and use of special characters and symbols.

Also being shown was the Shuffle-Buffer Parallel or Serial printer buffer with all kinds of nifty features. For information on all Pkaso products, contact Interactive Structures Inc., 146 Montgomery Ave., Bala Cynwyd, PA 19004. (215) 667-1713.

Also showing an enhanced version of a very successful product was **Orange Micro** with the Grappler+ printer interface. The new version has buffering (16K, 32K, or 64K) and color screen capabilities. Moreover, it can duplicate the Apple IIe 80-column text screen on the printer and allows all kinds of text manipulation, as well as graphics manipulation.

Users of the existing Grappler can add the buffering features with the add-on Bufferboard.

But perhaps, you don't need graphics printing capability; then the Orange Printer Interface may be the answer. It has all the text dump features of the Grappler boards (40- and 80-column screen dump, set page length, set mar-

graphics printer card. Graphmax is compatible with the Grappler+ card but has several extras such as zoom magnification up to 99 times, picture cropping, auto page numbering, and a wide range of aspect ratios. Price \$159.95.

Micromax was also showing *Cubit*, an excellent derivative of Q*bert. To succeed at *Cubit*, you need a good strategy as well as nimble fingers. \$39.95.

Micromax Systems, Inc., 6868 Nancy Ridge Dr., San Diego, CA 92121. (619) 457-3131.

Keyboards

CCP was showing an expanded line of Keywiz keyboards for the Apple. We were impressed with the Keywiz VIP (Very Intelligent Peripheral). It has 62 user-definable keys and can store up to four keyboard definitions in its own



EPS keyboard has PROM modules for use with various software packages.

Franklin 1000 and 1200. Either costs \$299.

Creative Computer Peripherals, 1044 Lacey Rd., Forked River, NJ 08731. (609) 225-0091.

A marvelous new add-on keyboard with plug-in PROMs for instant reconfiguration was being shown by ESP. The unit has 100 full-stroke keys divided into six sections: standard alphanumeric, numeric keypad, cursor movement keys, function keys, and two sections of special keys.

PROM cartridges are available for many software packages including *WordStar*, *VisiCalc*, *Applewriter II*, *Screenwriter II*, and many others. Basic and DOS are built into the basic unit. It has a six-foot coiled cord permitting lap operation. The basic unit plus interface lists for \$349; PROM modules are \$29.95 each.

Executive Peripheral Systems, 800 San Antonio Rd., Palo Alto, CA 94303. (415) 856-2822.

Another detachable intelligent keyboard is the OmegaBoard II from Zicor. It has a built-in 6504 mpu, 8K of EPROM memory, and 4K of RAM. This 115-key unit includes a type-ahead buffer, 32 function keys, each one of which can represent up to a 31-character user-definable command. Suggested retail is \$429.95.

Zicor, Inc., 2296 Cascade Plaza North, Woodbury, MN 55125. (612) 731-1762.

A novel approach to add-on keyboards is that taken by Polytel with their Keyport 717. We originally saw this unit at the SICOB show in Paris where it got an excellent reception. The basic unit has a flat membrane surface with a whopping 717 user-programmable positions. Each command has its



Zicor keyboard has microprocessor and 8K of memory.

gins, and more) at the modest price of \$99.

Orange Micro Inc., 1400 N. Lakeview Ave., Anaheim, CA 92807. (714) 779-2772.

Micromax was showing five Apple cards including their new Graphmax, a

memory. With it, you could define your own personalized keys for, say, *VisiCalc*, Pascal, Basic in Spanish, and numeric data entry. \$439.

The Keywiz 83 is specially designed for *VisiCalc* or *Magicalc*, various word processors, and numeric data entry. The Convertible model handles *VisiCalc* and *Applewriter II*, and works with the

EPYX GAMES



If you're one of those EPYX customers who keeps going back for more, we have good news for you.

Between now and February 29, 1984, we're offering you any computer game from this list... absolutely free.

It's simple. Just buy one of our computer games from your local retailer, then send us the box label showing number and computer type. Also, include the dated cash register receipt for the game. Most importantly, fill out the special order form telling us which FREE game you want, along with your name and address.

Buy one, get one free. Are you game for a deal like this?

Check the EPYX game you would like to receive free.

Atari	Apple (Disk Only)	Commodore 64	IBM (Disk Only)	VIC-20 (Cassette Only)	Radio Shack (Cassette Only)
Morloc's Tower <input type="checkbox"/>	Morloc's Tower <input type="checkbox"/>	Curse of Ra <input type="checkbox"/>	Curse of Ra <input type="checkbox"/>	Rescue at Rigel <input type="checkbox"/>	Invasion Orion <input type="checkbox"/>
Dragon's Eye <input type="checkbox"/>	Dragon's Eye <input type="checkbox"/>	Sword of Fargoal <input type="checkbox"/>	Rescue at Rigel <input type="checkbox"/>	Ricochet <input type="checkbox"/>	Morloc's Tower <input type="checkbox"/>
Crypt of the Undead <input type="checkbox"/>	Sorcerer of Siva <input type="checkbox"/>	Crush, Crumble & Chomp <input type="checkbox"/>		Crush, Crumble & Chomp <input type="checkbox"/>	Sorcerer of Siva <input type="checkbox"/>
The Nightmare <input type="checkbox"/>	Fore <input type="checkbox"/>				Rescue at Rigel <input type="checkbox"/>
King Arthur's Heir <input type="checkbox"/>					New World <input type="checkbox"/>
Escape From Vulcan's Isle <input type="checkbox"/>					

Please print or type your name in the space provided below. Send this form with your dated cash register receipt and box label to: EPYX Game Offer
P.O. Box 814
Young America, MN 55399

Name _____

Address _____

City _____

State _____

Zip _____

This offer is valid only in the Continental United States. Offer is void where prohibited by law. Please allow six to eight weeks for delivery of free game. Offer Expires February 29, 1984. All forms must be received by March 31, 1984. If your selection is not available when order is received, we reserve the right to substitute a similar product.



Strategy Games for the Action-Game Player
CIRCLE 125 ON READER SERVICE CARD



Educational overlay on Polytel 717 flat keyboard.

own key, the function of which is indicated by words, symbols, or pictures, so the user does not have to learn a language or respond to menus. The active surface of the Keyport 717 measures 9" x 22". It does not require an interface card, but connects to most computers through the gameport.

Several overlays with software are available for the Apple including ones for Basic programming, *VisiCalc*, and education (called "The Farm"). Price is a modest \$125 for the 717 and \$25 for each overlay with software.

Polytel Computer Products, 2121 S. Columbia, Tulsa, OK 74114. (918) 744-9844.

Analog Input

Transensory Devices had a model steam generator at their booth hooked to five sensor modules that continuously monitored steam pressure, water temperature, generator output, fuel temperature, and water level. The sensors were hooked in a daisy chain (up to 32 sensors with 100-meter separation) and then to the RS-232 port. Each sensor has an 8-bit dynamic range, 900 Hz bandwidth, and 0.4% accuracy. Price per sensor is only \$150. It looks to us as though this could open up a great array of new applications for small computers.

Transensory Devices, Inc., 44060 Old Warm Springs Blvd., Fremont, CA 94538. (415) 490-3333.

Modems

So you want to make a nightly call to your favorite computer bulletin board, but don't have a modem yet. How about the **Transend Apple** modem card? This is a direct-connect, 110/300 baud, auto dial/auto answer unit that supports both touch tone and pulse dialing (some others don't, you know). It all fits on one card in the Apple case, and comes with a six-foot cord that plugs into any modular telephone jack. The list price of \$325 is a bargain considering that it includes

So you want to make a nightly call to your favorite computer bulletin board, but don't have a modem yet. How about the Transend Apple modem card?

\$100 of time/services on The Source. If you really want the top-of-the-line, take a look at the TransModem 1200, a smart 1200-baud unit.

Transend Corp., 2190 Paragon Dr., San Jose, CA 95131. (408) 946-7400.

Okay, so you like tigers and jungle cats. **Novation** was giving out some nifty tiger stickers to promote their line of Cat and Smart-Cat modems. We have always been impressed by the high quality Novation line and like the idea of a 24-

hour on-line hot line (dial (213) 881-6880 and type CAT after the LOGIN PLEASE message).

Obviously, a big attention-getter at Applefest was the AppleCAT II and 212 modems. These are plug-in cards with 110 and 300 baud speeds (1200 baud at half duplex); automatic dial, answer, and disconnect; message hold; printer port; and the ability to use the modem as an ordinary telephone (with the addition of an optional handset). It can turn on devices through a BSR X-10 controller too! Prices start from \$389.

Novation's other modems, particularly the new J-Cat and 212 Auto-Cat were getting their share of attention also. J-Cat is a real miniature job (5" x 1.9" x 1.3"), but has manual or auto answer, status indicators, self-test, and many other features for just \$149.

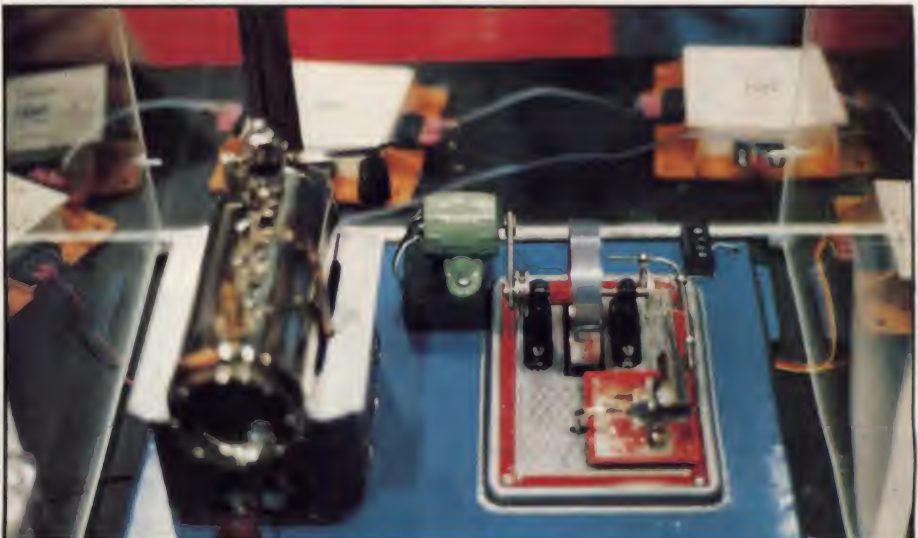
Novation, Inc., 20409 Prairie St., Chatsworth, CA 91311. (213) 996-5060.

Speech Synthesis

Street Electronics had their Echo II speech synthesizer board talking to passersby in a new seductive female voice in addition to the "normal" male voice. The package consists of a small circuit board, a disk with demonstration and utility programs, and a comprehensive manual. It is exceptionally easy to use with the text-to-speech program with algorithms for over 400 language and pronunciation rules.

The Echo II has 63 pitch levels, 15 volume levels, adjustable rate of speech, inflection or flat tone, and several other features to make it sound more nearly human. \$149.95.

Street Electronics Corp., 1140 Mark Ave., Carpinteria, CA 93013. (805) 684-4593.



Steam generator was being monitored by five Transensory Devices sensors.

A CASE THAT'S AS ADVANCED AS YOUR COMPUTER!



A. The strong stainless steel torque and groove frame, designed for moisture and dust resistance, is the only one of its kind.

B. Secure three-point latching is provided by lock and key, combined with an easy to use combination lock. Our Suregrip™ carry action swivel closures hold even when the case is dropped.

C. Customized foam interior is die-cut to fit and protect your computer. On larger cases the lid is padded with convoluted urethane foam for complete protection. On 20" cases the lid contains a folio designed to hold floppy discs, full 15" primour paper and manuals.

D. A sturdy wall of high impact resistant ABS (used in football helmets and auto bumpers) provides durable corner protection as well as good looks. The inconspicuous exterior of the case camouflages your computer for added security.

E. Comfortable padded handle makes carrying easy. Larger models also have easy glide reinforced wheels and the convenient T-bar pull handle that flips up when you need it, folds down for travel.

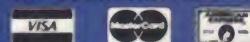
American Tourister computer cases offer you a way to carry, protect and camouflage your personal computer or printer in style. They're built with the same high quality and features that have made American Tourister luggage famous for more than 50 years.

Quality control atmospheric, stress and "abuse" tests



maintain the strict American Tourister quality standard. And in the event of loss, damage or theft, the unique American Tourister lifetime case registration program will verify the date of purchase for insurance claims. Available in metallic graphite gray and classic black.

**FULL ONE YEAR LIMITED WARRANTY
30 DAY MONEY-BACK GUARANTEE!**
USE YOUR VISA, MASTERCARD OR AMERICAN EXPRESS



TO ORDER:
CALL
TOLL FREE **1-800-341-6311**

IN RHODE ISLAND, CALL 401 273-2020.

© 1983 American Tourister®, Inc. 91 Main Street, Warren, RI 02885



SAVE
THIS AD
IT IS YOUR
CATALOG
AND CHANGES MONTHLY

THE WORLD'S LARGEST
COMPUTER MAIL ORDER FIRM

CONROY

ALL MAIL: Conroy-LaPointe, Inc., P.O. BOX 23068, Portland, OR. 97223
SHOWROOMS AT: PORTLAND, OR. or SEATTLE, WA. BOTH OPEN M-SAT 10-5

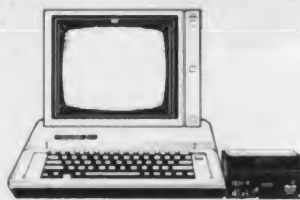
HARDWARE For The APPLE II+ / IIe

SOFTWARE for APPLE II+ / IIe

APPLE IIe 128K, 80 COLUMN
APPLE IIe, STARTER SYS. BY APPLE (Sys. A)
64K and 80 column
Disk II with controller
Apple Monitor
Call

APPLE IIe STARTER SYSTEM BY
CONROY-LA POINTE [SYSTEM B]
128K and 80 column
1 Micro-SD Drive with controller
Filer Utility and Apple DOS 3.3 Diskette
Zenith 12" Green Monitor
RF Modulator (for color TV)
Game Paddles
Game w/ color graphics and sound
50 Blank Generic Diskettes \$1.650

LIMITED WARRANTY: is 100% Parts & Labor for 90 days by us.



DISK DRIVES

* CENTRAL P.T. Filer, Utility & Apple DOS \$ 20 \$ 15

* A2 133K Disk Drive \$ 479 \$ 230
A2, 143K to 328K Drive \$ 569 \$ 429
A2 Controller Card \$ 100 \$ 79
* A40 160K Drive \$ 449 \$ 299
* A70 286K Drive \$ 599 \$ 299
A40 A70 Controller \$ 100 \$ 79

SUPER 5
12 HIGH
ALPS A40, Belt Drive, 163K \$ 299 \$ 199
TEAC, T40, Direct Drive, 163K \$ 349 \$ 239
TEAC, T80, Double Sided, 326K \$ 449 \$ 329
Controller Card \$ 110 \$ 59

Rana
Elite 1 163K 40TK \$ 379 \$ 249
Elite 2 326K 80TK \$ 449 \$ 299
Elite 3 652K 160TK \$ 449 \$ 299
Elite Controller \$ 145 \$ 84

VISTA
Disk Pak V1200, 6MB Backup Sys. \$1549 \$1049

OVERSTOCK SPECIALS

WHILE THEY LAST

* Axlon 320K RAM Disk System (I + or e) \$1000 \$650
* CCS, Serial Interface 7710A (Set) \$ 150 \$ 99
* Comix 16K RAM Card 11y (II or I) \$ 179 \$ 39
* Comix 16K RAM Card (I) \$ 295 \$ 125
* Microsoft 16K RAM Card (I) \$ 100 \$ 69
* Silicon Valley Word Handler \$ 60 \$ 39
* List Handler \$ 50 \$ 35
* Vides Videoterm, 80 column card for II+ \$ 345 \$ 229

RAM EXPANSION

* ALS ADOMem (I + or e) 16K \$ 100 \$ 59
* Comix 16K RAM Card (I) \$ 295 \$ 125
* Comix RAM Card 1Y (II or I) 16K \$ 179 \$ 39
* Microsoft RAM Card (I) 16K \$ 100 \$ 69
* Saturn Systems RAM Card (I + or e) 32K \$ 249 \$169
RAM Card (I) 64K \$ 425 \$299
RAM Card (I) 128K \$ 599 \$399
* Axlon RAM Disk System (I + or e) 320K \$1000 \$650

VIDEO CARDS

* ALS Smartem II (I + or e) \$ 179 \$139
Comix 80 Col. + 64K RAM (Ile) \$ 295 \$125
* Vides Videoterm 80 col. (I + or e) \$ 345 \$229
* UltraTerm (I + or e) \$ 379 \$279
Soft Video Switch (II + or I) \$ 35 \$ 25
Enhancer II (II + or I) \$ 149 \$ 99
Function Strip (II + or I) \$ 79 \$ 59
We Have Full Video Line Call Up to 35% off
Vista Vision 80 \$ 299 \$199

MISCELLANEOUS

* ALS The CP/M Card V3.0 (I + or e) \$ 399 \$299
Z Card (I + or e) \$ 169 \$129
* ASTAR RF Modulator to use TV \$ 35 \$ 25
* CCS Serial Interface 7710A \$ 150 \$ 99
Eastside Wind Card copier (I + or e) \$ 140 \$ 99
Wild Card Plus \$ 190 \$139
Kensington System Saver \$ 90 \$ 65
Key Tronic KB200 keyboard (II + or I) \$ 298 \$219
Koala Touch Tablet w/ Micro Illustrator \$ 125 \$ 85
Kraft Joystick (Ap II or I) \$ 65 \$ 49
Paddle (Ap II or I) \$ 50 \$ 39
* M&R Super Riser (I + or e) \$ 50 \$ 39
* Microsoft 280 Softcard (I + or e) \$ 345 \$225
280 Softcard Plus (I + or e) \$ 645 \$495
Softcard Premium Pack (II + or I) \$ 695 \$549
Softcard Premium Pack (Ile) \$ 495 \$395
Micro Tek Dumping 64 Buffer \$ 349 \$269
* Orange Micro Grappler Plus (I + or e) \$ 175 \$119
16K Buffer Board for Grappler \$ 175 \$119
Buffered Grappler 16K \$ 245 \$179
* Paymar Lower Case Chip (II + or I) \$ 50 \$ 39
* PCPI Apple II 4 features 6 Mhz 128K Memory Expand Board \$ 375 \$275
RH Electronics Super Fan II \$ 495 \$395
* Saturn Systems Accelerator II \$ 599 \$449
STC Softex The Creator \$ 200 \$139
Transend SSM AIOI Serial Par II \$ 225 \$169
TG Products Game Paddles (II + or I) \$ 40 \$ 29
Joystick (II or I) \$ 60 \$ 45
Vides PSIO I/F Card \$ 229 \$169

8" CP/M-80 SOFTWARE

MUCH MORE IN STOCK

ASHTON-TATE, Finance II \$ 700 \$ 385
Database Planning Lang \$ 700 \$ 385
Friday \$ 295 \$ 249
BLUE CHIP Milestone \$ 70 \$ 43
DIGITAL RES. CBASIC \$ 550 \$ 330
CBASIC Compiler (CB80) \$ 500 \$ 330
Pascal MT - \$ 350 \$ 239
CISC/COL \$ 850 \$ 575
PL 1 \$ 550 \$ 375
C Compiler \$ 350 \$ 250
FOX & GELLER, Quick Code \$ 295 \$ 185
g \$ 99 \$ 62
gGraph \$ 295 \$ 185
INFOCOM Starcross, Zork I, II or III, each \$ 50 \$ 34
Deadline or Planetfall, each \$ 60 \$ 40
MICROCRRAFT Verdict or Bilkeeper, each \$ 895 \$ 495
MICROPRO WordStar \$ 495 \$ 239
MailMerge \$ 250 \$ 129
WordStar Prof. 4 Pak (Call) \$ 895 \$ 429
MICROSOFT Multiplan \$ 275 \$ 195
COBOL 80 Compiler SPECIAL \$ 750 \$ 350

PLOTTERS

BAUSCH & LOMB, HOUSTON
DMP-40, 1 pen Cal on delivery \$ 725
DMP-29, 8 pen Cal on delivery \$1695
DMP-41 Cal on delivery \$1250
AMDEK DXY 10" x 14", Para \$ 749
Amplid II 10" x 14" 6 color S.P. \$1299 \$ 999

hp
H P 12C, Calculator \$ 120 \$ 99
H P 11C, Calculator \$ 90 \$ 75
41C, Calculator NEW \$ 355 \$ 275
41C, Calculator \$ 195 \$ 149
41C, Calculator w/ 2.2K Mem \$ 275 \$ 219

Call on accessories and software



for the ATARI
RANA 1000 Drive, 320K \$ 449 \$ 369
KOALA Pad w/ Micro Illustrator \$ 100 \$ 75

DISKETTES

BROWN DISC
10 each, Pulse I, DS, DO, 48TPI \$ 45 \$ 32
10 each, Pulse II, DS, DO, 96TPI \$ 60 \$ 45

CDC
100 each, SS, SD, 35T (Apple, Atari) \$ 450 \$ 169
10 each, SS, SD, 35T (Apple, Atari) \$ 45 \$ 18
100 each, SS, DO, 40T (Apple, IBM) \$ 550 \$ 179
10 each, SS, DO, 40T (Apple, IBM) \$ 55 \$ 19
100 each, SS, DO, 40T (IBM, HP) \$ 550 \$ 295
10 each, DS, DO, 40T (IBM, HP) \$ 75 \$ 35
10 each, DS, DO, 40T (IBM, HP) \$ 69 \$ 39
10 each, DS, DO, 48T (IBM, HP, etc) \$ 89 \$ 49
MAXELL 10 each, MD1, SS, SD \$ 55 \$ 29
10 each, MD2, SS, SD \$ 75 \$ 39

MEMOREX
10 each, SS, SD, Type A (Apple, Atari) \$ 45 \$ 25
10 each, DS, DO, Type B (IBM, HP) \$ 60 \$ 35
VERBATIM 10 each, MD5-21, SS, SD \$ 49 \$ 25
10 each, MD34, SS, SD \$ 84 \$ 45

* GENERIK "DISKETTES" - AS LOW AS \$1
100 each SS, SD 35 Trk (Apple, Atari) \$ 415 \$ 130
100 each SS, SD 35 Trk (Apple, Atari) \$415 \$ 995
100 each DS, DO 40 Trk (IBM, HP) \$ 626 \$ 170
100 each DS, DO 40 Trk (IBM, HP) \$526 \$ 1400

W/ jackets, no labels, top quality. 90 day limited warranty by us

W/ jackets, no labels, top quality. 90 day limited warranty by us

GENERIK DISKETTES
Each at 1000 quantity.

SS SD \$1.00 Each
DS DD \$1.40 Each

CDC
SS SD \$1.69 Each

Minimum order quantities apply
See above money back guarantee
by CONROY Corporation next us.

MODEMS AND ACCESSORIES

ANCHOR Signalman MK I Modem (RS232) \$ 99 \$ 75
Mark XII \$ 399 \$ 269
HAYES IBM-PC Smartmodem 1200B \$ 599 \$ 430
IBM-PC Smartmodem II Software \$ 119 \$ 89
Stack Chronograph (RS-232) \$ 249 \$ 189
Stack Smartmodem 300 (RS-232) \$ 269 \$ 225
Smartmodem 1200 (RS-232) \$ 699 \$ 535
Microcom 100 (RS-232) \$ 399 \$ 275
Microcom II (for the Apple II) \$ 239 \$ 239
IBM-PC to Modem Cable \$ 39 \$ 29

NOVATION
IBM PC Access 1-2-3 Package \$ 595 \$ 445
Appelink II 3000, 3000 BAUD \$ 389 \$ 269
212 Apple Cat, 1200 BAUD \$ 725 \$ 559
PC-Cat with Crossstalk \$ 595 \$ 419
Cat \$ 139 \$ 139
J-Cat \$ 149 \$ 104
212 Auto Cat \$ 695 \$ 579
Smart Cat 103 212 \$ 595 \$ 415
Transend SSM Transend 1 for Apple II \$ 89 \$ 69
Modem Card for the Apple II \$ 299 \$ 259
Transend 1200 \$ 695 \$ 559

MONITORS

* AMDEK 12" Green, 300G \$ 200 \$ 135
* 12" Amber, 300A \$ 210 \$ 149
* 12" Amber, 310A for IBM-PC \$ 230 \$ 159
* 13" Color I, Composite \$ 379 \$ 289
* 13" Color II, RGB, Hi Res \$ 529 \$ 439
* DVN, Color II or III to Apple II/F \$ 199 \$ 175
* NEC 12" Green, Model BJ201M \$ 249 \$ 159
* 12" Color, Composite, JC1215M \$ 400 \$ 299
* 12" Color, RGB, IBM Model JC 1203 \$ 699 \$ 569
* PRINCETON RGB Hi Res, HX-12 \$ 795 \$ 499
* QUADRAM Quadchrome 12" RGB Color \$ 795 \$ 499
* Quadchrome 17" 968 x 512 \$1995 \$1595
* SANYO 12" Green, Model DM8112CX \$ 260 \$ 199
* TTK Small Terminal 3000 \$ 599 \$ 499
* ZENITH 12" Green, Model ZVM123 NEW \$ 200 \$ 115

PRINTERS AND ACCESSORIES

DOT MATRIX PRINTERS: LIST PRICE OUR PRICE

EPSON FX80 \$ 995 \$ 630
MX100F/T 80 CPS, w/ Grafix + \$ 995 \$ 630
FX100 \$ 15 \$ 9
Apple II Graphics Dump Program \$ 250 \$ 209
LEADING EDGE, Gonila Banana \$ 160 \$ 100
MANNESTAM TALLY 160L 80 Col \$ 180 \$ 132
CALL \$ 180 \$ 132
Sprint, 80 CPS \$ 349 \$ 249
OKIDATA 82A, 80 col., 120 cps, Para \$ 749 \$ 499
83A, 132 col., 120 cps, Para \$ 749 \$ 499
92, 160 CPS, 80 Col. Para \$ 599 \$ 499
93, 160 CPS, 136 Col. Para \$ 999 \$ 699
2350P, Pacermark, 350 cps, Para \$ 3295 \$ 2495
2410P, Pacermark, 350 cps, Para \$ 3295 \$ 2495
ORANGE MICRO Grappler +, for Apple \$ 165 \$ 119
PRACTICAL Microbuffer In-Line 64K, Para \$ 349 \$ 259
Microbuffer In-Line 64K Serial \$ 349 \$ 259
* STAR MICRO, Gemini 10" X 120cps, 2.3K \$ 409 \$ 289
Gemini 15" X 120cps, 2.3K \$ 409 \$ 289
IBM-PC to Epson or Star Micros Cable \$ 60 \$ 35
Apple II/F and Cable for Epson or Gemini \$ 95 \$ 59
LETTER QUALITY - DAISY WHEEL PRINTERS: \$ 700 \$ 539
JUKI 6100, 107cps, 80 Col. Parallel \$ 700 \$ 539
SILVER REED EXP550P, 18 cps, 3 pitch \$ 895 \$ 595
EXP550S, 18 cps, 3 pitch \$ 895 \$ 595
* TTX 1014, 13 cps, Para & Ser, Pk & Friction \$ 449 \$ 499
SUPPLIES: Tractor Feed Paper, Ribbons, Daisy Wheels

CORVUS

6 Meg \$2095 \$1695
11 Meg \$2750 \$2350
Drives Are Without Interfaces 20 Meg \$3750 \$3250
IBM-PC Interface Manual, S.W. & Cable Kit \$ 300 \$ 249
* IBM-PC Omni Transporter, 4 Pak Special \$1895 \$1495
Apple Interface, Manual, S.W. & Cable Kit \$ 300 \$ 249
Other Interfaces, Omni, Consultation, Mirror, CALL

* MEANS A BEST BUY

AD #987

ORDERING INFORMATION AND TERMS: All items usually in stock. Cashiers Checks, Money Orders, Telephone 1000 Checks and Government Checks, we immediately honor. Personal or other Company Checks are 20 days to clear. No C.O.D. Please request a 3% cash discount on AD0 3% off below prices for VISA or MC. For U.S. Mailed, add 3% (\$5 minimum) for shipping, insurance and handling (S&H) by UPS. UPS ground is standard to all 3% (\$10 minimum) for S&H. Add 12% total (\$15 minimum) for S&H for US Postal, APO or FPO. For Hawaii, Alaska and Canada, UPS is in some areas only. All orders are Postal so call, write or specify Postal. Foreign orders except Canada for S&H add 18% or \$25 minimum for S&H except for monitors add 30% or \$50 minimum for S&H. Prices subject to change, type errors, and availability to call to verify. All goods are new, include warranty and are guaranteed to work. Due to our low prices and our assurance that you will get new unused products, ALL SALES ARE FINAL. Call before returning goods for repair or replacement. Orders received with insufficient S&H charges will be refunded. ORDER DEADLINE: 6:00 P.M. PST, Monday through Friday and 10:00 A.M. Saturday. 6 A.M. here is 8 A.M. in New York.

OUR REFERENCES: We have been in computers and electronics since 1958, a computer dealer since 1978 and in computer mail order since 1980. Banks: 1st Interstate Bank, (503) 643-4678. We belong to the Chamber of Commerce (503) 644-0173. Better Business Bureau and Direct Marketing Association, or Call Dunn and Bradstreet if you are a subscriber. Fastback and Generik are trademarks of Conroy Corporation.

CASH & CARRY OUTLETS:
Over-the-counter sales only. Open Monday through Saturday 10:00 until 5:00.
PORTLAND, OREGON, 11557-D S.W. Pacific Hwy. Terrace Shopping Center, Tigard, OR 97156 between 217 and I-5 245-1023
SEATTLE, WASH., 3540 126th Ave. SE, Bellevue, WA 98005, Tele: 641-4736. In Leehamm's Plaza near Factoria Square. SE of Hwy. 405 and 90 at SE 39th & Richards

-LA POINTE™

Formerly
Computer Exchange

LOW PRICES TO PROFESSIONALS WHO KNOW WHAT THEY WANT AND KNOW HOW TO USE IT!
THE IBM-PC SUPPLY CENTER

**DEALERS
WE BUY
EXCESS
INVENTORIES**



IBM is a trademark of IBM Corporation.

256K IBM-PC

System Includes
Two 320K Disk Drives by CDC
90 Day Warranty By Us
Call For Details And
Configurations

MEMORY CHIP KITS Add-on to your memory cards or mother board. 100% tested. With 90 day warranty.
★ 64K Kit, 200NS, 9 chips, 4164 \$ 50 \$ 45
16K Kit, 200NS, 5 chips, 4116 (for PC-1 mother board) \$ 50 \$ 16

AMDEK 4-IN-1 Multiple Board, Color Graphics, Mono, 128K \$ 599 \$ 519

AST ComboPlus, 64K S/P C \$ 395 \$ 279
ComboPlus, 256K S/P C \$ 695 \$ 475
MegaPlus II, 64K, 2-S/P C \$ 495 \$ 345
MegaPlus II, 256K, 2-S/P C \$ 795 \$ 495
256K MegaPlus II Expander \$ 395 \$ 295
SixPackPlus, 64K, S/P C \$ 395 \$ 295
SixPackPlus, 256K, S/P C \$ 695 \$ 495
SixPackPlus, 384K, S/P C \$ 895 \$ 595
I/O Plus II, 25 P-C G \$ 315 \$ 195
PCnet™ LAN Kit \$1490 \$1290

CCS SuperVision, monochrome board \$ 850 \$ 680
Z Plus 64, fast 280B, 64K para port \$ 875 \$ 695

★ **ComX** 256K RAM Card with Fasttrak™ RAM disk emulator and spooler software. \$ 695 \$ 256

CURTIS PC Pedestal™ for Display \$ 80 \$ 65
3 to 9 foot keyboard cable \$ 50 \$ 35
Vertical CPU "System Stand" \$ 25 \$ 19
Monochrome Ext. Cable Par \$ 40 \$ 30

HERCULES Monochrome Board \$ 499 \$ 349

Key Tronic KBS150, Std. keyboard \$ 269 \$ 199

Koala Koala Pad™ \$ 150 \$ 109
Programmer's Guide \$ 15 \$ 12

MAYNARD Multifunction (6) Card, MFC \$ 89 \$ 79
Modules for above card \$ 199 \$ 169
SandStar, no RAM card \$ 499 \$ 395
SandStar, 256K Card \$ 499 \$ 395

MICROSOFT RAMCard 256K \$ 550 \$ 385
SystemCard 256K \$ 395 \$ 275
SystemCard 64K \$ 625 \$ 435
Mouse \$ 195 \$ 145

MOUSE SYSTEMS PC Mouse w/software \$ 295 \$ 195
ORCHID PCnet™ Starter Kit, LAN \$1490 \$1190
PC net™ Circuit Board Kit \$ 695 \$ 545
Monochrome Graphics Card \$ 499 Call

PLANTRONICS ColorPlus, 16 color brd. w/Para Port \$ 475 \$ 375

QUADRAM Quadlink™ NEWEST VERSION \$ 680 \$ 485

Quadboard, no RAM, expandable to 256K \$ 295 \$ 215
Quadboard 64K, expandable to 256K \$ 395 \$ 279
Quadboard 256K, 6 function \$ 595 \$ 395
Quadboard II, no RAM, expand to 256K \$ 395 \$ 295
Quadboard II, 64K, expandable to 256K \$ 595 \$ 395
Quad 512 - 64K plus serial port \$ 325 \$ 265
Quad 512 - 256K plus serial port \$ 550 \$ 420
Quad 512 - 512K plus serial port \$ 895 \$ 625
Quadcolor I, board, 16 colors \$ 295 \$ 225
Quadcolor II, board, use with Quadcolor I \$ 275 \$ 209
Quadchrome, 12" RGB Monitor \$ 795 \$ 499
Quadscreen, 17" 966 x 512 Monitor \$1995 \$1595
MicroLazer, w/ Copy, P.P. 8K, #MP6 w/P.S. \$ 189 \$ 129
MicroLazer, w/ Copy, P.P. 64K, #MP64 w/P.S. \$ 319 \$ 219
MicroLazer, w/ Copy, P.P. 128K, #MP128 w/P.S. \$ 465 \$ 295
MicroLazer, Snap-on, 64K, P.P. Epson, #ME8 w/P.S. \$ 179 \$ 145
MicroLazer, Snap-on, 64K, P.P. Epson, #ME64 w/P.S. \$ 319 \$ 225
All MicroLazars are expandable, (w/ copy to 512K) (Snap-on to 64K)

Tecmar 1st MATE, 64K \$ 389 \$ 295
1st MATE, 256K \$ 589 \$ 439
Graphics Master \$ 65 \$ 49

TG PRODUCTS Joystick \$ 65 \$ 49
WICO, IBM PC Mouse \$ 100 \$ 69



Prices and availability subject to change. Call

\$45

64K CHIP KIT

9 Each 4164, 200ns, MEMORY EXPANSION, 90 Day Warranty by us.

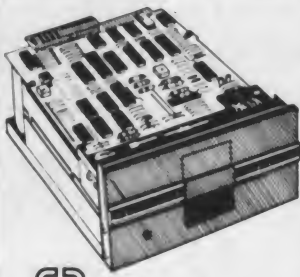
\$256

\$239 Two or more.

256K RAM BOARD

Fully Compatible 2 Year Limited Warranty by ComX.
With Fasttrak RAM Disk Emulator and Spooler Software.
Works on DOS 1.1 or 2.0

DRIVES AND ACCESSORIES



CONTROL DATA OR Tandon

320K/360K DS DD DISK DRIVES

With Detailed Installation Instructions
60 Day Warranty by Factory Authorized Distributor
Same as now installed by IBM. **\$229** \$239 For One.

**\$199
HALF HEIGHT**

MAYNARD Floppy Drive Control Bnd. for up to 4 drives \$ 195 \$ 165
same with Parallel Port \$ 275 \$ 205

RANA 2.5 Meg 5" Drive System (Lan) \$1150 \$1195
25 Meg Hard Disk System Call

QUADRAM 6 Meg, Removable \$2295 \$1795
6 Meg, Fixed \$1995 \$1595
12 Meg, Fixed \$2250 \$1750
20 Meg, Fixed \$2650 \$2050
27 Meg, Fixed \$2895 \$2295
72 Meg, Fixed \$6500 \$4950

VISTA IBM-PC XT 6MB Backup for Hard Disk, V1200 \$1549 \$1049

SOFTWARE FOR IBM-PC or XT

BUSINESS

	LIST PRICE	OUR PRICE
ALPHA Database Manager II	\$ 295	\$ 195
ASHTON-TATE		
★ dBase II requires PC-DOS & 128K	\$ 700	\$ 385
dBase II User's Guide (Book)	\$ 30	\$ 20
Everyman's DB Primer (Book)	\$ 15	\$ 12
The Financial Planner	\$ 700	\$ 395
Friday	\$ 295	\$ 199
APPLIED SOFT. TECH. Versaform	\$ 389	\$ 265
ASK MICRO GL AR AP INV or PRL each	\$ 495	\$ 295
BPL GL AR AP or PRL	\$ 595	\$ 395
★ CONTINENTAL Home Accountant	\$ 150	\$ 89
FCM (Filing, Cataloging, Mailing)	\$ 125	\$ 89
Property Management	\$ 495	\$ 329
DATAMOST Write On (Word Processor)	\$ 130	\$ 89
DOW JONES Market Analyzer	\$ 350	\$ 279
Market Manager	\$ 300	\$ 239
Market Microscope	\$ 700	\$ 525
EAGLE SOFTWARE Money Decisions	\$ 150	\$ 129
★ EINSTEIN Writer	NEW \$ 300	\$ 199
Memory Trainer	NEW \$ 80	\$ 55
Speller	NEW \$ 150	\$ 95
Mailer	NEW \$ 80	\$ 55
Letter Scenes	NEW \$ 300	\$ 195
FOX & GELLER Quickcode (MSDOS)	\$ 295	\$ 179
Quickgraph (MSDOS)	\$ 295	\$ 179
Auto for IBM PC DOS	\$ 99	\$ 58
HAYDEN IBM Pe Writer	\$ 200	\$ 135
Pe Speller	\$ 100	\$ 69
HOWARDSON Real Estate Analyzer II	\$ 250	\$ 189
Tax Preparer 1984	\$ 295	\$ 200
IUS EasyWriter II (IWP)	\$ 350	\$ 250
EasySpeller II	\$ 225	\$ 140
EasyFiler II (DBMS)	\$ 400	\$ 299
Business System GL - AR - AP	\$1495	\$995
GL, AR, AP, OR, OE or INV, each	\$ 595	\$ 395
★ INSOFIT Data Design (easy to use DBMS)	\$ 225	\$ 169
LIFETIME Volkswriter	\$ 265	\$ 195
★ LOTUS 1-2-3	\$ 445	\$ 329
MICROCRAT Verdict or Billkeeper, each	\$ 995	\$ 469
MICRO LAB Tax Manager	\$ 250	\$ 169
MICROPRO WordStar	\$ 495	\$ 239
Main Merge	\$ 250	\$ 129
SpellStar	\$ 225	\$ 169
★ WordStar Professional 4 Pak	\$ 695	\$ 429
StarIndex	\$ 195	\$ 109
InfoStar	\$ 285	\$ 259
Report Star	\$ 350	\$ 199
StarBurst	\$ 195	\$ 115

BUSINESS

	LIST PRICE	OUR PRICE
★ MICROSOFT, Multiglan	\$ 275	\$ 175
Word	\$ 375	\$ 275
Word with Mouse	\$ 475	\$ 339
Financial Statement	\$ 100	\$ 69
Budget	\$ 150	\$ 109
MONOGRAM Dollars & Sense	\$ 165	\$ 110
NORTH AMERICAN BUS. The Answer	\$ 250	\$ 160
★ OSBORNE COMX, (Book & Business)		
Statistics & Math Programs on DS/DD Disks		
Some Common Basic Prog. (70 each)	\$ 100	\$ 69
Practical Basic Programs (40 each)	\$ 100	\$ 69
PBL CORPORAL Personal Investor 1.1	\$ 145	\$ 99
PEACHTREE, Peach Pak (GL, AR & AP)	\$ 395	\$ 239
Peach Text 5000	\$ 395	\$ 239
PEARLSOFT, Personal Pearl (DBMS & MS)	\$ 295	\$ 195
★ PERFECT, Perfect Writer™	\$ 389	\$ 149
Perfect Speller™ or Perfect Calc™ each	\$ 295	\$ 99
Writer - Speller 2 Pak	\$ 695	\$ 199
Perfect Filer™	\$ 595	\$ 199
SOFTWARE ARTS, TK1 Solver	\$ 299	\$ 219
SOFTWARE PUBLISHING, PFS File	\$ 140	\$ 94
PFS Report	\$ 125	\$ 84
PFS Write	NEW \$ 140	\$ 95
PFS Graph	NEW \$ 140	\$ 95
SORCIM, SuperCalc II	\$ 295	\$ 195
SuperCalc III	\$ 395	\$ 265
SSI SATELLITE WordPerfect	\$ 495	\$ 375
Personal WordPerfect	\$ 195	\$ 149
STC/STC TEC The Creator	\$ 300	\$ 195
STONEWARE Advanced D.B. Master	\$ 595	\$ 395
SYNAPSE, File Manager	\$ 100	\$ 67
SYNERGISTIC Data Reporter	\$ 250	\$ 169
TIMAKER T Maker III	\$ 275	\$ 169
VISICORP, VisiCalc 4	\$ 250	\$ 179
VisiFile or VisiSchedule	\$ 300	\$ 219
Desktop Plan I	\$ 300	\$ 219
VisiWord with VisiSpell (128K)	\$ 375	\$ 269

UTILITY & SYSTEM

1983 CLC SOFTWARE AWARD:
"Copy II PC by Central Point Software is still the best software buy of 1983 and 1984. It will copy many copy protected software and faster than any other backup system. Unlike other copiers it makes an exact duplicate of your originals and it does 100% verification of copy. Documentation is excellent."
★ CENTRAL POINT, Copy II PC, Backup \$ 40 \$ 35
★ COMX, Fasttrak™, RAM Disk emulator and printer spooler program. Works on any PC DOS version or RAM Card. Menu Driven \$ 100 \$ 59

UTILITY & SYSTEM

	LIST PRICE	OUR PRICE
DIGITAL RESEARCH		
Concurrent CP/M-86™	\$ 350	\$ 235
CBASIC 86™	\$ 200	\$ 135
CP/M-86™	\$ 60	\$ 40
Pascal MT+ (CP/M-86)	\$ 400	\$ 269
Pascal MT+ (MSDOS)	\$ 600	\$ 399
PL1 (MSDOS)	\$ 750	\$ 499
Access Manager (MSDOS)	\$ 400	\$ 179
Display Manager (MSDOS)	\$ 500	\$ 339
Speed Prog. Pkg. (CP/M-86)	\$ 200	\$ 135
CIS COBOL 86	\$ 850	\$ 525
DR LOGO-86	\$ 100	\$ 69
CBASIC Compiler (86 or MSDOS, each)	\$ 600	\$ 365
HAYES, SmartComm II (Data Comm.)	\$ 119	\$ 89
MICROCOM Microterminal (Data Comm.)	\$ 100	\$ 65
MICROSTUF, Crosstalk XVI (Data Comm.)	\$ 195	\$ 129
MICROSOFT, muMath muSimp	\$ 300	\$ 225
Business BASIC Compiler	\$ 600	\$ 450
Pascal Compiler	\$ 350	\$ 255
C Compiler	\$ 350	\$ 225
BASIC Compiler	\$ 395	\$ 285
Fortran Compiler	\$ 350	\$ 255
COBOL Compiler	\$ 750	\$ 559
BASIC Interpreter	\$ 350	\$ 255
NORTON, Norton Utilities 2.0 14 programs	\$ 80	\$ 65
ROSESOFT, Prokey	\$ 75	\$ 49

HOME & EDUCATIONAL

EPYX Auto. Sim. Temple of Apeha: Old Barons	\$ 40	\$ 29
★ ARMONK Executive Suite	\$ 40	\$ 27
BLUE CHIP Millionaire or Tycoon, each	\$ 60	\$ 39
BPSYSTEMS, Personal Accounting	\$ 195	\$ 139
★ BRODERBUND, Apple Panic (Color)	\$ 30	\$ 19
COMPREHENSIVE PC Tutor (DOS 1.1)	\$ 60	\$ 40
CONTINENTAL Home Accountant - ea	\$ 150	\$ 89
DATAMOST Pkg Plan or Space Strike, ea	\$ 30	\$ 22
DAVIDSON, The Speed Reader II	\$ 75	\$ 49
INFOCOM, Deadline or SUSPENDED, ea	\$ 50	\$ 33
Zork or Zork II or Zork III, ea	\$ 30	\$ 27
★ INSOFIT, Word Trn or Quottr, each, NEW	\$ 35	\$ 29
MICRO LAB Miner 2049	\$ 40	\$ 29
MICROSOFT, Flight Simulator	\$ 50	\$ 33
MONOGRAM Dollars & Sense	\$ 165	\$ 110
PBL CORP., Personal Investor	\$ 145	\$ 99
SPINNAKER Snooper Troops (1 or 2)	\$ 45	\$ 35
Story Machine or Face Maker	\$ 35	\$ 24
STRATEGIC the Warp Factor	\$ 40	\$ 30
SUBLOGIC, Might Mission Pinball	\$ 40	\$ 27



★ Means a BEST buy.
AD #987

© 1983 by Conroy-LaPointe, Inc. All rights reserved.

CIRCLE 112 ON READER SERVICE CARD

NATIONAL TOLL FREE
ORDER DESK (800) 547-1289
Order Desk Hours: 6AM to 6PM PST
Oregon TOLL FREE [800] 451-5151 Hot Line For Information On Your Order
Portland 245-6200 [503] 245-1030

AARDVARK LTD.

NOW THE BEST COST LESS



DUNGEONS OF DEATH - A serious role playing game for up to 6 players. You get a choice of race and characters that grow from game to game. You also get a graphic maze and a 15 page manual.

Available On: TRS80C 16K EXT., CMD64, VIC20 13K, IBMPC, TRS80C 32K, MC10 16K

TAPE \$14.95

DISK \$19.95

BAG-IT-MAN - The ultimate arcade game for TRS80C or MCD64. This one has three screens full of BAGS OF GOLD, CARTS & ELEVATORS TO RIDE IN, MINE SHAFTS, and TWO NASTY GUARDS. Great sound and color and continuous excitement.

Available On: TRS80C 32K, CMD64

TAPE \$19.95

DISK \$24.95



QUEST - A different kind of Graphic Adventure, it is played on a computer generated maze of Alesia. You'll have to build an army and feed them through combat, bargaining, exploration of ruins and temples, and outright banditry! Takes 2 - 5 hours to play and is different each time.

Available On: TRS80C 16K, CMD64, VIC20 13K, MC10 16K, T199 (EXT. BASIC), IBMPC

TAPE \$14.95

DISK \$19.95

STARFIRE - If you enjoyed Star Raiders or Star Wars, you will love Starfire. It is not a copy, but the best shoot-em-up, see them in the window space game on the CMD64 or TRS80C. The fantastic graphics will put you right in the control room as you hyperspace from quadrant to quadrant fighting the aliens and protecting your bases.

Available On: TRS80C 16K, CMD64

TAPE \$19.95

DISK \$24.95



WIZARDS TOWER - A fantasy game played on a map of forests and dungeons - with dragons and wizards to kill. Similar to QUEST and fun for adults, but a little simpler and playable for the younger set (8 - 60).

Available On: TRS80C 16K EXT., CMD64, VIC20 13K, T199, IBMPC

TAPE \$14.95

DISK \$19.95

PYRAMID - ONE OF THE TOUGHEST ADVENTURES. Average time through the pyramid is 50 - 70 hours. Clues are everywhere and some ingenious problems make this popular around the world.

Available On: TRS80C 16K, CMD64, MC10 16K, TIMEX, IBM PC, T199, VIC20 13K

TAPE \$14.95

DISK \$19.95



AARDVARK offers over 120 original high quality programs. Send one dollar for a current catalog and receive a \$1.00 gift certificate good towards your next purchase.

Authors - AARDVARK pays top dollar for high quality programs. Send a copy today for a personal review and editorial help.

TO ORDER: Send amount indicated plus \$2.00 shipping, per order. Include quantity desired and your preference of tape or disk. Be sure to indicate type of system and amount of memory. When using charge card to order by mail, be sure to include expiration date.



CHARGE CARDS
WELCOME



1-313-669-3110

PHONE ORDERS ACCEPTED
8:00 a.m. to 8:00 p.m. E.S.T., MON-FRI

AARDVARK *Action Software*

2352 S. COMMERCE • WALLED LAKE, MI 48088 • (313) 669-3110

CMD64 / TRS80C / IBMPC / VIC20 / T199

CIRCLE 101 ON READER SERVICE CARD



Dynax/Brother HR-25 connected to our Model 100 printing out Applefest notes.

Printers and Plotters

Dynax, the U.S. distributor for the Brother product line, was showing two daisy wheel printers. We printed some text from our Model 100 on the Brother

We printed some text from our Model 100 on the Brother HR-25 and were most impressed with the excellent print quality.

HR-25 and were most impressed with the excellent print quality. The unit has a 3K buffer, two-color printing, graphics, boldface, super- and subscripts, double strike, underline, and proportional spacing. Print speed is 23 cps. It handles paper up to 16.5" wide and uses either friction or optional tractor feed. Price is a surprisingly modest \$999.

If that's still too much, the DX-15 is priced at just \$599 and has virtually every feature of its big brother (no pun intended). The main differences are print speed (13 cps) and maximum paper width (13.5"). In addition, the DX-15 has an optional keyboard so it can be used as (surprise!) an electric typewriter.

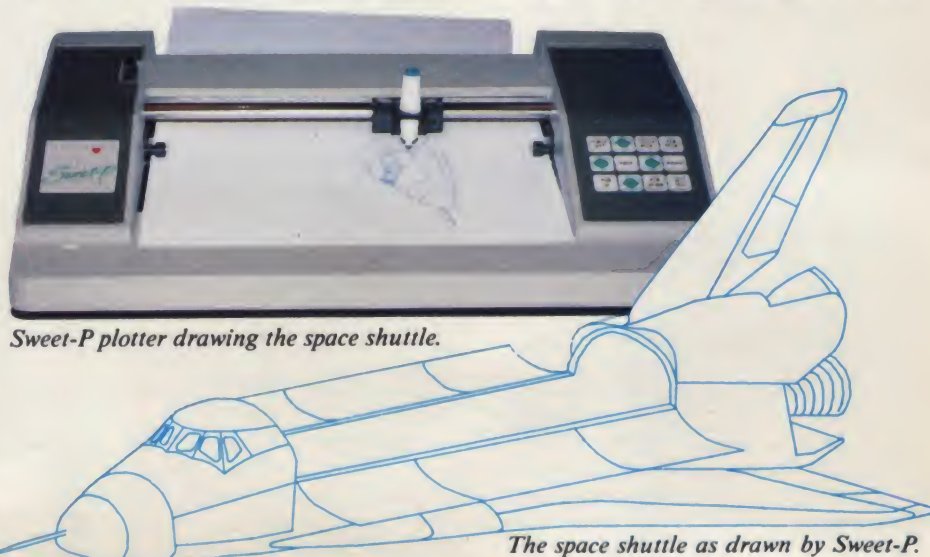
Dynax, Inc., 5698 Bandini Blvd., Bell, CA 90201. (213) 260-7121.

So you like pictures better than words—the Sweet-P plotter was drawing them at a rapid clip. It uses roll or

single sheet paper (normally 8½" x 11") and has a step size of 0.004". It has a rich command set of relative and absolute commands and is compatible with the Apple, IBM PC, and CP/M machines with a Centronics interface. A friendly feature of Sweet-P is the software which permits you to make plots easily from commercial packages such as VisiCalc, Apple Business Graphics, and Lotus 1-2-3. Price is \$795.

Enter Computer, Inc., 6867 Nancy Ridge Dr., San Diego, Ca 92121. (619) 450-0601.

Another plotter which we have mentioned previously but have not yet tested is the Roland DXY800. This is a flat bed unit capable of handling paper up to 11" x 17". Step size is 0.1mm, and it uses eight pens for dramatic color effects. It includes both a parallel and serial interface and has a wide variety of commands



Sweet-P plotter drawing the space shuttle.

to make plotting almost as easy as drawing. The 8-color version costs \$995, and the one color unit is \$750. Watch for a review.

Roland Corp., 7200 Dominion Circle, Los Angeles, CA 90040. (213) 685-5141.

Accessories

Looking for a little added comfort for long data entry sessions with your Apple? Oak Rest is a wrist rest that clamps in front of the Apple and is said to significantly reduce fatigue and arm pain. It is also nifty looking and is sure to get people asking, "What's that?" List price is \$34.95.

Applause, 20440 Williams Ave., Saratoga, CA 95070. (408) 741-1124.

The Magellan light pen is an interesting new accessory for the Apple. It can



Magellan light pen can make screen spaghetti (or it it graffiti?)

produce drawings in the high resolution mode (one pixel accuracy), at very high speed (60 updates per second). The unit is interfaced via a small electronic module into the game port, but it is transparent to joysticks or game controls (how

Applefest, continued...

do they do that?). We saw it being demonstrated on a large 23" TV set with all kinds of overhead and background lighting on the show floor, yet the pen was performing flawlessly. \$189.95.

Magellan Computer, Inc., 4371 E. 82nd St., Indianapolis, IN 46250. (317) 842-9138.

The folks at one booth asked us, "Who sold more joysticks at Applefest than anyone else?" We should have known, since it was the Hayes booth. Ironically, we have evaluated over 40 joysticks but never the Mach II or Mach III units from Hayes (that will be rectified next month). Anyway, we tried one at the show and found it exceptionally responsive and accurate. Moreover, models are available for the Apple II and IIe, IBM PC, and Color Computer at a considerably lower price than many others on the market.

Who sold more joysticks at Applefest than anyone else?

Hayes Products, 1558 Osage St., San Marcos, CA 92069. (619) 744-8546.

Graphics

Doublestuff was attracting many double takes with their exceptional high-resolution pictures on the Apple. Indeed, it was difficult to believe that it really was an Apple. Peter Joselow told us the Apple people themselves were so impressed with the system that on the second day of the show, they started to show it in the graphics section of the Apple booth. It has been said that a picture is worth 1000 words so we have included one made with the Doublestuff software package. But if you really want the words, look elsewhere in this issue for a major review of the package. Price is only \$39.95.

Doublestuff Software, 505 Court St., Brooklyn, NY 11231. (212) 237-2589.

Third Millennium Engineering Corp., a new company, was showing a product called the Arcade Board. It is a sprite graphics and sound effects board with 16K of built-in memory. It provides 15 colors, three graphics modes, 35 prioritized planes, and 32 sprites. For easy animation, only two bytes in a table must be changed to move a sprite to any

other screen location.

The three on-board tone generators have a nine-octave range (calling all dogs) and can produce both noise and tones.

The board comes with Amparcade, a graphics and sound language; price \$295.

Third Millennium Engineering Corp., 1015 Gayley Ave., Los Angeles, CA 90024. (213) 473-2102.

Another sprite board with remarkable capability is Super Sprite from Syntex, announced a few months ago (reviewed in this issue). It allows up to 32 sprites and has sound synchronized to the action. Moreover, an Echo II speech synthesizer, incorporated on the board, allows it to speak. The Ampersprite language lets you take full advantage of all the many features of the Super Sprite.

Syntex Inc., 10635 NE 38th Pl., Kirkland, WA 98033. (206) 828-4884.

Not a new product, but a really neat one, is the **Number Nine** graphics board for the Apple. It produces an unbelievable 1024 x 1024 pixel resolution; 16 simultaneous colors (or up to 256 colors with a multi-card system); hardware drawing features with vectors, arcs, and rectangles (at the rate of 800 nanoseconds per pixel); character draw and area fill; pan, scroll, and zoom; light pen interface; and a comprehensive software package. This is a state-of-the-art graphics system that turns the Apple into a professional system rivaling ones at ten times the price. List prices range from \$945 to \$1195.

Number Nine Computer Engineering, 691 Concord Ave., Cambridge, MA 02138. (617) 492-0999.

Michael Darooge of Baudville, a new company, was showing off a hi-res graphics package, *Pixit*. It is a picture editor with a large library of shapes including 3-D geometrics, cartoon characters, electronic symbols, music symbols, and various textures. *Pixit* works like a word processor so no programming skills are necessary to use it. Text can be included in several different fonts and sizes. List price is \$49.95.

Baudville, 1001 Medical Park Dr. SE, Grand Rapids, MI 49506. (616) 957-3036.

Imaginator is a series of professional programs for creating, editing, manipulating, and displaying 3-D graphics images. The main module is a menu-driven graphics editor which accepts input data

as points, lines, or objects. Once created, objects can be rotated in any plane, the type of projection can be varied (perspective or orthogonal), and the location of the eye point and view point varied along with the distance from the eye

Imaginator is a series of professional programs for creating, editing, manipulating, and displaying 3-D graphics images.

point to the picture plane. Displayed images can be saved on disk or dumped to a printer with any of the popular graphics dump cards (Dumpling, Grappler, Microbuffer, et al.).

Imaginator comes in two versions. The first is for B&W work with single objects and costs \$129, while the Imaginator 2 is for B&W or color work with multiple objects and costs \$189.

Townsend Microware, P.O. Box 1200, Port Townsend, WA 98368. (206) 385-4080.

The **Computer Colorworks** Division of Jandel Corp. was showing a nifty graphics entry system, The Digital Paintbrush, and associated software package, *Flying Colors*.

The Digital Paintbrush consists of a flat box with two strings coming out each side attached to a pen on the outside and two potentiometers on the inside. You simply use the pen to draw a picture, and the results appear automatically on the screen. It is as easy as using pencil and paper.

It is made even more friendly with the *Flying Colors* software package. This provides the user with different size and



The Digital Paintbrush uses two strings (invisible in photo) to measure position of pen.

The personal, portable daisywheel printer.

Only \$599.

For the first time, your letter-quality printer can be used almost anywhere! Bring the new Transtar 120 with you to work, to school, and home again! Conveniently weighing in at less than 19 pounds, it generates unrivaled print quality and is the size of a standard briefcase. The new 120 is so light, so small, that you can take it with you!

Remarkably, the new \$599 Transtar 120 is "plug and go" compatible with the best-selling word processing programs. Just plug the 120 into your personal computer and watch this precision printer purr along at 14 cps Shannon text speed producing superscript, subscript, underlining and a true boldface. Even using letterhead is now a breeze with the 120's automatic single sheet loading!

Don't worry about durability: it's a tough little machine. It joins the highly reliable family of Transtar printers with a failure rate that's the envy of the industry: less than 1%. Should your 120 ever need repair, a nationwide network of authorized service centers stands ready for speedy repair on your six-month end-user warranty.

Just think of it: everything you want in a letter-quality printer...anywhere you want it. Only \$599.

Transtar

P.O. Box C-96975, Bellevue, Washington 98009
CIRCLE 199 ON READER SERVICE CARD



apple
discount
software

CALSOFT

Personal—Entertainment—Business SOFTWARE



Low Discount Prices/Check Our Super Sale Prices
Fast Convenient Service/Same day shipping on most orders
Large Selection of Software/Call or Write for our FREE Catalog!

We have all the latest
software—ASK US!

ATARI, IBM PC, CP/M,
COM 64: send for
FREE catalog!

Call Toll Free: (800) 423-5290 In California: (213) 991-9641

BEAGLE

	List Price	Our Price
DOS Boss.....	24.00	20.40
Utility City.....	29.50	25.05
Apple Mechanic.....	29.50	25.05
Pronto DOS.....	29.95	25.45
Double Take.....	34.95	29.70
★ Beagle BASIC.....	34.95	26.20

BPI SYSTEMS

General Ledger.....	395.00	316.00
Accounts Receivable.....	395.00	316.00
Accounts Payable.....	395.00	316.00
Business Analyst.....	195.00	165.75

BANK STREET WRITER

~~69.95~~ 52.45

BRODERBUND

★ The Arcade Machine.....	59.95	44.95
Choplifter.....	34.95	29.70
★ AE.....	34.95	26.20
Sea Fox.....	29.95	25.45
Gumball.....	29.95	25.45
Lode Runner.....	34.95	29.70
Spare Change.....	34.95	29.70

CONTINENTAL

★ Home Accountant.....	74.95	56.20
★ CPA Modules #1-4 (each).....	250.00	187.50
FCM.....	99.95	84.95
Tax Advantage.....	69.95	59.45

DECISION SUPPORT

The Accountant.....	129.00	109.65
★ The Business Accountant.....	255.00	191.25

EDU-WARE

Prisoner 2.....	32.95	28.00
★ Algebra 1-4 (each).....	39.95	29.95
Algebra 5 & 6.....	49.95	42.45
★ Fractions/Decimals (each).....	49.00	36.75
PSAT/SAT Word Skills (each).....	49.00	41.65

HAYDEN

★ Orca/M.....	149.95	112.45
Pie Writer 2.2.....	149.95	127.45
Sargon II.....	29.95	25.45

INFOCOM

★ Zork I, II, III (each).....	39.95	29.95
Deadline.....	49.95	42.45
Starcross.....	39.95	33.95
Suspended.....	49.95	42.45
Witness.....	49.95	42.45
Planetfall.....	49.95	42.45
★ Enchanter.....	49.95	37.45
Infidel.....	49.95	42.45

MICROSOFT

	List Price	Our Price
★ Multiplan.....	275.00	206.25
Typing Tutor II.....	24.95	21.20
★ Applesoft Compiler.....	175.00	131.25
Multi-Tool Financial Statement.....	100.00	85.00

PENGUIN

★ Complete Graphics System.....	79.95	59.95
★ Graphics Magician.....	59.95	44.95
Transylvania.....	19.95	16.95
The Quest.....	19.95	16.95
Coveted Mirror.....	19.95	16.95

SIERRA ON-LINE

Ulysses.....	34.95	29.70
★ Dark Crystal.....	39.95	29.95
Cross Fire.....	29.95	25.45
★ Screen Writer.....	129.95	97.45
★ Screen Writer Professional.....	199.95	149.95
★ Ultima II.....	59.95	44.95
Frogger.....	34.95	29.70
The Artist.....	79.95	67.95
★ General Manager.....	229.00	171.75
Homeward.....	49.95	42.45
Jawbreaker.....	29.95	25.45
Troll's Tale.....	29.95	25.45
Sammy Lightfoot.....	29.95	25.45
Mr. Cool.....	29.95	25.45
Quest for Tires.....	34.95	29.70
Oir's Well.....	29.95	25.45
Aquatron.....	29.95	25.45

SPINNAKER

★ Snooper Troops #1, #2 (each).....	44.95	33.70
The Most Amazing Thing.....	39.95	33.95
Face Maker.....	34.95	29.70
Kindercomp.....	29.95	25.45

ASCII EXPRESS PRO

~~129.95~~ 97.45

STRATEGIC SIMULATIONS

Computer Quarterback.....	39.95	33.95
Napoleon's Campaigns.....	59.95	50.95
Guadalcanal Campaign.....	59.95	50.95
Cosmic Balance II.....	39.95	33.95
Germany: 1985.....	59.95	50.95
Bomb Alley.....	59.95	50.95
★ Fighter Command.....	59.95	44.95
RDF: 1985.....	34.95	29.70
★ North Atlantic '86.....	59.95	44.95
Knights of the Desert.....	39.95	33.95
Geopolitique 1990.....	39.95	33.95
★ Ringside Seat.....	39.95	29.95
Broadsides.....	39.95	33.95
Professional Golf Tour.....	39.95	33.95
Fortress.....	34.95	29.70
Queen of Hearts.....	34.95	29.70

SIR TECH

	List Price	Our Price
Wizardry.....	49.95	42.45
Knight of Diamonds.....	34.95	29.70
Legacy of Hyllgamyn.....	39.95	33.95

PFS:WRITE

~~149.00~~ 105.00

SOFTWARE PUBLISHING

★ PFS:File.....	125.00	93.75
★ PFS:Report.....	125.00	93.75
★ PFS:Graph.....	125.00	93.75

MISCELLANEOUS

Accounting Plus G/L.....	395.00	316.00
Chess 7.0.....	69.95	59.45
★ DB Master 3.0.....	229.00	171.75
★ DB Master 4.0.....	350.00	262.50
Dollars & Sense.....	100.00	85.00
★ Incredible Jack.....	179.00	134.25
Ken Uston's Blackjack.....	69.95	59.45
Lisa 2.6.....	79.95	67.95
Master Diagnostics.....	55.00	47.75
MasterType.....	39.95	33.95
★ Merlin.....	64.95	48.70
Micro Cookbook.....	40.00	34.00
Microterminal.....	84.95	72.20
Miner 2049er.....	39.95	33.95
★ Sensible Speller IV.....	125.00	93.75
Spellicopter.....	39.95	33.95
Sticky Bear ABC.....	39.95	33.95
Tax Preparer 1984.....	CALL	CALL
Terrapin Logo.....	149.95	127.45
Transend II.....	149.00	126.65
Ultima III.....	54.95	46.70
★ Visicalc.....	250.00	193.75
Visicalc 80 Col. Preboot.....	49.00	41.65
Zaxxon.....	39.95	33.95

IBM PC SOFTWARE

BPI Personal Accounting.....	195.00	156.00
Crosstalk.....	195.00	156.75
★ dBase II.....	700.00	439.00
Flight Simulator.....	49.95	42.45
Friday.....	295.00	236.00
★ Microsoft Word.....	395.00	296.25
Multimate.....	495.00	396.00
Norton Utilities.....	80.00	68.00
PC Tutor.....	59.95	50.95
Peachpak (GL/AR/AP).....	395.00	316.00
Peachtext 5000.....	395.00	316.00
Personal Investor.....	145.00	123.25
Smartcom II.....	119.00	101.15
★ Wordstar.....	495.00	371.25
Ultima II.....	59.95	50.95
Ultrafile.....	195.00	156.00
Visiword.....	375.00	299.00

CALSOFT

346 N. Kanan Rd. #103
Agoura, CA 91301

Call Toll Free: (800) 423-5290 In California: (213) 991-9641

We accept Mastercard & Visa (include # and Expiration Date), check, COD \$2.00 extra, or Money Order. California residents add 6% sales tax. Include \$2.00 for shipping (UPS Blue Label \$3.50, Canada \$6.00, other foreign countries 10% of order - minimum \$10.00).

★ Sale prices are through February only! Prices subject to change without notice.

Applefest, continued...

shape paintbrushes, a menu of graphics shapes (lines, boxes, circles), and the ability to fill areas with colors and add text to an image. A thoughtful touch is the feature that allows you to store images and play them back in a slide show mode. Price is a modest \$39.95.

Jandel Corp., 3030 Brideway, Sausalito, CA 94965. (415) 331-3022.

Micron Technology was showing MicronEye, an optical system to let your computer see. It consists of a very small lens assembly, tripod, interface card (for Apple, IBM PC, Commodore 64, or Color Computer), software and manuals. The uses are limited only by your imagination; some that spring to mind are character recognition, graphics input, surveillance, experiment monitoring, and time-lapse motion studies.

The MicronEye uses a standard TV camera lens coupled to a 64K memory device called an OpticRam. The



The MicronEye in operation.

MicronEye has a resolution of 128 x 256 pixels and scans two to five frames per second in typical room lighting. Price is a surprisingly modest \$295.

Micron Technology Inc., 2805 East Columbia Rd., Boise, ID 83706. (208) 383-4000.

Software

Perhaps one of the least understood products at the show was Excalibur's



Neil Clemmons of Excalibur gave us an excellent demonstration of the Savvy system.

Savvy system. Physically, it consists of a circuit board, a master disk, several applications disks, and a fat manual. Conceptually, it is an operating system, a virtual resource manager, an English-like language, an associative memory, and an automatic program generator. Perhaps most notably, Savvy is a personality that actively tries to figure out what you mean when you type on the keyboard. Savvy accepts whatever you type and gives it its best shot. It gets better and better as it gains experience.

The folks at Excalibur realized that they had a tiger by the tail and that getting the whole message of Savvy across was nigh impossible. Hence, they are now positioning it as a powerful database building and management system and letting users discover the natural language features.

There are three Apple versions of Savvy, a home-oriented single disk version for \$349, a Pro version for multiple disk systems for \$495, and the Business version with six applications programs for \$999. There are versions for the IBM PC and XT also.

Excalibur Technologies Corp., 800 Rio Grande Blvd. NW, Mercado 21, Albuquerque, NM 87104. (505) 242-3333.

The *Dollars and Sense* package from **Monogram** is a money management package that includes templates for household, business, and income tax accounts. It can establish up to 120 budget accounts along any lines you specify—

monthly or annual, fixed or variable. It can write checks, make transactions, and remind you to pay your bills. It has a "what if?" capability that allows you to modify specific accounts and look at the overall effect without actually making the change. Available for both Apple and IBM PC.

Monogram, 8295 South LaCienega Blvd., Inglewood, CA 90301. (213) 215-0529.

Knoware has gotten a good deal of publicity in the business and financial press because of its well-known principals: John Donovan of the M.I.T. Sloan School; Tom Tower, former vice president of Visicorp; and Archie McGill, former president of a division of AT&T. Unfortunately, their showing at Applefest did not live up to the advance billing.

We asked for a brief description and were told to watch a 15-minute demonstration. We asked about their marketing plans and were told they would be running a multi-million dollar campaign in all the "important" media (*Business Week*, *Fortune*, *The Wall Street Journal*, etc.) and that personal computing magazines weren't in their mainstream.

Knoware has gotten a good deal of publicity in the business and financial press because of its well-known principals.

Anyway, from what we gathered, **Knoware** is an educational package with tutorials and simulations that give you experience with a spreadsheet, word processing, database management, programming, graphics, and financial analysis. It is available for the Apple and IBM PC and XT.

Knoware, 301 Vassar St., Cambridge, MA 02139. (617) 576-3821.

Waightware was showing a clever software package called a *Six Pack* consisting of four applications program disks and two blank disks. Each program contains all the files and instructions necessary for its use; thus no manual is necessary. We tried one and found it exceptionally easy to learn and use.

The four applications programs are an



M A K E




NEW

FROM

PRENTICE®

CORPORATION

THE CONNECTION

A stylized graphic of a landscape with a blue arc and a red arrow. The background is a gradient of dark blue and purple. A bright blue arc starts from the left and curves towards the right. A red arrow starts from the left and points towards the right, following the curve of the blue arc.

POPCOM, X100
the new, easy-to-
use communica-
tions tool that
connects you and
your personal
computer to the
wondrous, mind
expanding, enlight-
ening world of
Information.

POPCOMTM X100

- **Automatic or manual dialing and answering** for all voice and data calls.
- **Voice and data transmission during the same call** — ends the 3 separate calls ("I'm going to send," "I'm sending," "Did you get what I sent?")
- **Smart modem compatible** — works with widely available communications software.
- **Flexibility** — compatible with 103, 113, and 212A dial-up modems; connects to all standard single and multi-line equipment.
- **Fast, easy setup** — 'tune' tells when the three cables are properly connected.
- **Adjustment-free operation** — no manual switches to contend with. The X100 automatically takes its instructions from your PC or terminal.
- **Automatic computer briefing** — reports to your PC all call-progress tones ... dial tone, busy signal, remote ringing, talk, even line disconnect — so your computer can do more.
- **"In-Use"** light on multi-line phones — protects against inadvertent interruption.
- **Smart interface** — automatically adapts itself to various RS232 cables.
- **Versatile installation** — fits conveniently on wall, desk or floor.

See your dealer or write for more information. Make the connection between yourself and the challenging world of information.

- ☐ Please send me literature on POPCOM products.
- ☐ Please call me immediately.

NAME	TITLE
COMPANY	TEL:
ADDRESS	STATE ZIP

PRENTICE CORPORATION, 266 Caspian Dr., P.O. Box 3544,
Sunnyvale, CA 94088-3544, (408) 734-9855

CIRCLE 218 ON READER SERVICE CARD

Give Your Apple



68000 SPEED

SAYBROOK™ The Third Alternative

An increasing number of Apple II users have reached the limits of their machines' capabilities. These users face a dilemma: to upgrade to a new computer system or not to upgrade.

That, is no longer the question. Saybrook offers the third alternative.

SAYBROOK is the 68000 co-processor for the Apple II. Once inserted, Saybrook transforms the modest Apple into an awesome micro-mainframe computer, capable of 10-30 times the speed of the Apple, with twice the memory on-board!

By drawing upon state-of-the-art technology, Saybrook brings the Apple II user a new dimension of power as yet unknown.

HARDWARE

- Motorola MC 68000 32/16 bit microprocessor, 8 MHz (12.5 MHz upgrade available now.)
- 128K RAM on-board, expandable to 512K (off-board expansion to 16 megabytes)
- 24 hour time of day clock
- operating system timer (multiple user capability).

SOFTWARE


Standard—• Standard operating system: UCSD p-System Version IV.1 Pascal, FORTRAN-77, BASIC compilers included • Applesoft-compatible 68000 BASIC • 68000 Assembler • Apple peripheral compatibility including 80 column cards, 5¼ and 8 inch disk drives, RAM disks, and much more. **Optional**—• p-System application package including spreadsheet by Timberline and word processor by TICOM (both IBM P. C. software), FORTH. **Coming Soon:** CP/M-68K, UNIX.

BENEFITS

1. **Speed**—Saybrook's MC68000 32/16 bit microprocessor runs programs ten to thirty times faster than the Apple II.
2. **Memory**—Saybrook gives you 128K RAM on-board—expandable to 512K on-board. Saybrook is capable of off-board expansion up to 16 megabytes.
3. **Software**—Saybrook will run Apple Pascal, FORTRAN, and BASIC Apple programs—ten to thirty times faster. In addition, Saybrook accesses the enormous UCSD p-System library of software.
4. **Cost**—\$1,550 suggested retail price, (\$1,950 for 12.5 MHz Saybrook) includes the Saybrook 68000 co-processor with 128K RAM on-board; the UCSD p-System with Pascal, FORTRAN-77, and BASIC compilers. (\$1,425 value) In addition, Applesoft-compatible, 68000 BASIC is included. p-System application package, FORTH optional. CP/M 68K and UNIX will be available soon. Saybrook comes with a full six month parts and labor warranty. In addition, Saybrook customers are automatically included in the membership of the Saybrook users group.

Saybrook offers superior hardware, superior software, superior price. Saybrook is the third alternative.

For additional information on Saybrook, to order, or for the location of the dealer nearest you, call or write:

 Analytical Engines, Inc.
3415 Greystone, Suite 305 Austin, Texas 78731
(512) 346-8430

Saybrook is a trademark of Analytical Engines, Inc. APPLE II is a registered trademark of Apple Computer, Inc. Lisa is a trademark of Apple Computer, Inc. UCSD p-System is a trademark of The Regents Of The University of California. CP/M-68K is a registered trademark of Digital Research. UNIX is a trademark of Bell Laboratories.

CIRCLE 208 ON READER SERVICE CARD

Applefest, continued...

inventory file system, financial security record, mailing list program (675 records), and telephone directory (1000 records). All have both screen and print options. For all Apples.

Waightware, 31 Crippleridge Ct., San Mateo, CA 94402. (415) 572-1028.

A friendly family group all dressed in blue and white were promoting **Carolyn's Household Computer Program**, a double sided disk for the Apple. One side of this easy-to-use disk contains a shopping list generator, imaginative list of recipes, coupon reminder, pantry list (580 items), and calorie counter. The other side contains a long list of household hints for stain removal, minor repairs, and other helpful tips.

We tasted the fudge made from the recipe on the disk and the chocolate fanatics in our group proclaimed it delicious.

Price is \$59.95 by mail from Carolyn's Problem Solvers, 2061 Anise Dr., El Paso, TX 79935. (915) 592-5314.

An eclectic collection of software packages was being shown by **Craftsbury Software**. *Micro Chef* has a disk full of interesting recipes and will scale them for any size group, make shopping lists, and index other recipes as well as its own. \$39.95.

Other programs include *Mail Manager*, a comprehensive system for up to 9999 names (\$89.95); *People Tracker*, a scaled-down *Mail Manager* (\$34.50); *Memory Jogger*, a time management/appointment calendar system (\$34.50); *Wine Connoisseur* to keep track of a cellar inventory and tasting notes (\$39.95); and four others.

Craftsbury Software, 1623 Montague St. NW, Washington, DC 20011. (202) 829-3121.

A new company, **Priority Software**, was showing an adventure game, *Forbidden Quest*, with a new twist. Basically, it is a text adventure, but it comes with five posters (one in color, and four B&W). The posters, as well as providing some nice wall decoration, also contain clues for solving the adventure.

Priority Software, P.O. Box 221959, Carmel, CA 93922. (408) 625-0125.

Ibid Inc. was showing the first adventure in their Vodac series, *The Alpine Encounter*. It is a hi-res game with 93 full-color locations and 28 fascinatingly alive characters. The arcade-like skiing sequences are breathtaking and realistic. Vodac, in case you are interested, is a

sinister political force dedicated to the overthrow of the free world (shades of James Bond). The game is on two disks for \$59.95.

Ibid Inc., 179 Allyn St., Suite 607, Hartford, CT 06103. (203) 547-0085.

Electronic Arts had a classy booth with an attention-getting crackling blue

Electronic Arts had a classy booth with an attention-getting crackling blue light tube running across the back.

light tube running across the back. Being demonstrated on large screen monitors were several games including *The Last Gladiator* (that means you). In the arena with you are a snake, robot, abominable snowman, and a dragon, against which your weapons (gun, stick, and net) seem to have little effect.

Along the lines of the excellent ALF music system, is the new *Music Construction Set*. Music playback is accompanied by the staffs scrolling horizontally on the screen.

Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403. (415) 571-7171.

Educational Software

There was a great deal of educational software being shown at Applefest. Watch for reviews in upcoming months. Meanwhile, here is a smattering of what was on the show floor.

Laureate Learning Systems was showing several packages aimed at learning disabled youngsters. All of them use the Echo II speech synthesizer to provide spoken as well as visual feedback. *Speak Up* is an interesting system for school or home that lets you create words and phrases and use them in other programs.

Laureate Learning Systems, 1 Mill St., Burlington, VT 05401. (802) 862-7355.

Fay is an attractive young lady who leads you through spelling instruction (3000 words or your own) in a word search format (\$34.95) or through arithmetic instruction in an animated program called, *Fay: That Math Woman* (\$29.95).

Didatech Software, 2301-1150 Jervis

St., Vancouver, BC V6E 2C8. (604) 687-3468.

Jeepers Creatures is a cute package that has 30 basic animals with interchangeable heads, torsos, and legs. With it, you can create an owligrator, an octocatfish, or any one of 26,000 other creatures. Great fun! *My House, Your House* is also aimed at preschool users and lets you walk around a house and furnish rooms with people, pets, and furniture in any way you choose. Sink on the bedroom ceiling? Why not? \$34.95 each for Apple, Atari, or Commodore.

Kangaroo, Inc., 332 S. Michigan Ave., Suite 700, Chicago, IL 60604. (312) 987-9050.

Three word games, *Word Search*, *Word Match*, and *Word Scramble* were being shown by Hi Tech. *Word Match* was one we hadn't seen before. Basically, it allows you to create up to 20-item matching quizzes with a word or two and a definition. All three packages are aimed at teachers but could be used in the home as well. *Word Search* costs \$34.95 and the other two are \$24.95.

Hi Tech of Santa Cruz, 126 Light-house Ave., Santa Cruz, CA 95060. (408) 425-5654.

More for recreational than educational use is *Annacrostics Dilemma*, a disk of 20 crossword puzzles. This is an excellent way to hone your word skills and become familiar with interesting quotes and clever phrases. For one to four players, Apple II or IIe, \$25.00.

AVREX, P.O. Box 2072, Saratoga, CA 95070. (408) 257-1202.

And A Robot

Not just computers, but robots as well. RB5X was at the show showing off his Polaroid rangefinder eyes, five-way arm and hand, three drive wheels for quick mobility, and eight tactile sensors, all controlled and monitored by his on-board microprocessor. Perhaps the best way to get acquainted with robots before making that big \$1795 purchase, is by getting RB's Robot Appreciation Kit. It contains a book about robots, reference list of articles, copy of a monthly robotics newsletter, literature on the RB5X including a copy of the reference manual, a collection of short stories by Isaac Asimov, a bumper sticker and poster, all for \$19.95.

RB Robot Corp., 14618 W. 6th Ave., Ste. 201, Golden, CO 80401. (303) 279-5525.

THE FORTH SOURCE™

MVP-FORTH

Stable - Transportable - Public Domain - Tools

You need two primary features in a software development package a stable operating system and the ability to move programs easily and quickly to a variety of computers. MVP-FORTH gives you both these features and many extras. This public domain product includes an editor, FORTH assembler, tools, utilities and the vocabulary for the best selling book "Starting FORTH". The Programmer's Kit provides a complete FORTH for a number of computers. Other MVP-FORTH products will simplify the development of your applications.

MVP Books - A Series

- ☐ **Volume 1, All about FORTH** by Haydon. MVP-FORTH glossary with cross references to fig-FORTH, Starting FORTH and FORTH-79 Standard. 2nd Ed. \$25
- ☐ **Volume 2, MVP-FORTH Assembly Source Code.** Includes CP/M*, IBM-PC*, and APPLE* listing for kernel \$20
- ☐ **Volume 3, Floating Point Glossary** by Springer \$10
- ☐ **Volume 4, Expert System** with source code by Park \$25
- ☐ **Volume 5, File Management System** with interrupt security by Moreton \$25

MVP-FORTH Software - A Transportable FORTH

- ☐ **MVP-FORTH Programmer's Kit** including disk, documentation, Volumes 1 & 2 of MVP-FORTH Series (All About FORTH, 2nd Ed & Assembly Source Code), and Starting FORTH. Specify ☐ CP/M, ☐ CP/M 86, ☐ CP/M+, ☐ APPLE, ☐ IBM PC, ☐ MS-DOS, ☐ Osborne, ☐ Kaypro, ☐ H89/Z89, ☐ Z100, ☐ TI-PC, ☐ MicroDecisions, ☐ Northstar, ☐ Compupro, ☐ Cromenco \$150

- ☐ **MVP-FORTH Cross Compiler** for CP/M Programmer's Kit. Can also generate headerless code for ROM or target CPU \$300
- ☐ **MVP-FORTH Meta Compiler** for CP/M Programmer's kit. Use for applications on CP/M based computer. Includes public domain source \$150
- ☐ **MVP-FORTH Fast Floating Point** includes 9511 math chip on board with disks, documentation and enhanced virtual MVP-FORTH for Apple II and IIe. \$450
- ☐ **MVP-FORTH Programming Aids** for CP/M, IBM or APPLE Programmer's Kit. Extremely useful tool for decompiling, califinding, and translating. \$150
- ☐ **MVP-FORTH** by ECS for IBM-PC or ATARI*. Standalone with screen editor, License required. \$100
- ☐ **MVP-FORTH** by ECS for IBM-PC or ATARI. With color animation, multitasking sound, utilities, and license. \$175
- ☐ **MVP-FORTH Professional Application Development System (PADS)** for IBM-PC, or APPLE. A three level integrated system with complete documentation. Complete system \$400

- ☐ **MVP-FORTH Expert System** for development of knowledge-based programs for Apple, IBM, or CP/M \$80
- ☐ **MVP-FORTH File Management System (FMS)** with interrupt security for IBM, Victor 9000, or CP/M \$200

FORTH DISKS

FORTH with editor, assembler, and manual.

- ☐ **APPLE** by MM \$100
- ☐ **APPLE** by Kuntze \$90
- ☐ **ATARI** valFORTH \$60
- ☐ **CP/M** by MM \$100
- ☐ **HP-85** by Lange \$90
- ☐ **HP-75** by Cassidy \$150
- ☐ **IBM-PC** by LM \$100
- ☐ **NOVA** by CCI 8" DS/DD \$150
- ☐ **Z80** by LM \$50
- ☐ **8086/88** by LM \$100
- ☐ **VIC FORTH** by HES, VIC20 cartridge \$50
- ☐ **C64** by HES Commodore 64 cartridge \$60

Enhanced FORTH with: F-Floating Point, G-Graphics, T-Tutorial, S-Stand Alone, M-Math Chip Support, MT-Multi-Tasking, X-Other Extras, 79-FORTH-79.

- ☐ **APPLE** by MM, F, G, & 79 \$140
- ☐ **ATARI** by PNS, F, G, & X \$90
- ☐ **CP/M** by MM, F & 79 \$140
- ☐ **Apple, GraFORTH** by I \$75
- ☐ **Multi-Tasking FORTH** by SL, CP/M, X & 79 \$395
- ☐ **TRS-80/II or III** by MMS, F, X, & 79 \$130
- ☐ **Timex** by FD, tape G, X, & 79 \$45
- ☐ **Victor 9000** by DE, G, X \$150
- ☐ **Extensions for LM Specify** IBM, Z80, or 8086
 - ☐ Software Floating Point \$100
 - ☐ 8087 Support (IBM-PC or 8086) \$100
 - ☐ 9511 Support (Z80 or 8086) \$100
 - ☐ Color Graphics (IBM-PC) \$100
 - ☐ Data Base Management \$200
- ☐ Requires LM FORTH disk.

fig-FORTH Programming Aids for decompiling, califinding, and translating. CP/M, IBM-PC, Z80, or Apple \$150

CROSS COMPILERS Allow extending, modifying and compiling for speed and memory savings, can also produce ROMable code. *Requires FORTH disk.

- ☐ CP/M \$300
- ☐ 8086 \$300
- ☐ Northstar* \$300
- ☐ IBM \$300
- ☐ Z80 \$300
- ☐ Apple II/II+ \$300

FORTH COMPUTER

- ☐ **Jupiter Ace** \$150
- ☐ 16K RAM Pack \$50
- ☐ 48K RAM Pack \$125

Key to vendors:

CCI Capstone Computing Inc. MM MicroMotion
DE Dai-E Systems MMS Miller Microcomputer Services
FD Forth Dimension NS Nautilus Systems
I Insoft PNS Pink Noise Studio
LM Laboratory Microsystems SL Shaw Labs

Ordering Information: Check, Money Order (payable to MOUNTAIN VIEW PRESS, INC.), VISA, MasterCard, American Express. COD's \$5 extra. Minimum order \$15. No billing or unpaid PO's. California residents add sales tax. Shipping costs in US included in price. Foreign orders, pay in US funds on US bank, include for handling

FORTH MANUALS, GUIDES & DOCUMENTS

- ☐ **ALL ABOUT FORTH** by Haydon. See above. \$25
- ☐ **FORTH Encyclopedia** by Derick & Baker. Programmer's manual to fig-FORTH with FORTH-79 references. Flow charted, 2nd Ed. \$25
- ☐ **Understanding FORTH** by Reymann \$3
- ☐ **FORTH Fundamentals, Vol. I** by McCabe \$16
- ☐ **FORTH Fundamentals, Vol. II** by McCabe \$13
- ☐ **Beginning FORTH** by Chirlian \$17
- ☐ **FORTH Encyclopedia Pocket Guide** \$7
- ☐ **And So FORTH** by Huang. A college level text. \$25
- ☐ **FORTH Programming** by Scanlon \$17
- ☐ **FORTH on the ATARI** by E. Floegel \$8
- ☐ **Starting FORTH** by Brodie. Best instructional manual available. (soft cover) \$18
- ☐ **Starting FORTH** (hard cover) \$23
- ☐ **68000 fig-Forth** with assembler \$25
- ☐ **Installation Manual for fig-FORTH**, \$15
- ☐ **1980 FORML Proc.** \$25
- ☐ **1981 FORML Proc 2 Vol** \$40
- ☐ **1982 FORML Proc.** \$25
- ☐ **1981 Rochester FORTH Proc.** \$25
- ☐ **1982 Rochester FORTH Proc.** \$25
- ☐ **1983 Rochester FORTH Proc.** \$25
- ☐ **A FORTH Primer** \$25
- ☐ **Threaded Interpretive Languages** \$23
- ☐ **META FORTH** by Cassidy \$30
- ☐ **Systems Guide to fig-FORTH** \$25
- ☐ **Invitation to FORTH** \$20
- ☐ **PDP-11 User Man.** \$20
- ☐ **FORTH-83 Standard** \$15
- ☐ **FORTH-79 Standard** \$15
- ☐ **FORTH-79 Standard Conversion** \$10
- ☐ **Tiny Pascal fig-FORTH** \$10
- ☐ **NOVA fig-FORTH** by CCI Source Listing \$15
- ☐ **NOVA** by CCI User's Manual includes editor, assembler, and utilities \$25
- ☐ **Jupiter ACE Manual** by Vickers \$15

Source Listings of fig-FORTH, for specific CPU's and computers. The Installation Manual is required for implementation. Each \$15

- ☐ 1802 ☐ 6502 ☐ 6800 ☐ AlphaMicro
- ☐ 8080 ☐ 8086/88 ☐ 9900 ☐ APPLE II
- ☐ PACE ☐ 6809 ☐ NOVA ☐ PDP-11/LSI-11
- ☐ 68000 ☐ Eclipse ☐ VAX ☐ Z80

and shipping by Air. \$5 for each item under \$25, \$10 for each item between \$25 and \$99 and \$20 for each item over \$100. All prices and products subject to change or withdrawal without notice. Single system and/or single user license agreement required on some products.

DEALER & AUTHOR INQUIRIES INVITED

MOUNTAIN VIEW PRESS, INC.

PO BOX 4656

MOUNTAIN VIEW, CA 94040

(415) 961-4103



Will Laser Discs Save The Coin-op Industry?

*A Report And
Prognostications
From A Famous
Gamer*

Ken Uston

Why do we report on the coin-op game industry? Because the games that you play in the arcades today (and their derivatives) are the games you will play at home tomorrow. We think that trends in the coin-op industry foreshadow trends in the home entertainment market, and we want to give you a preview of what is coming down the pike.

Because of the precarious state of the coin-op industry, the 35th Annual AMOA International Exposition of Games and Music took on far more meaning than just another display of the new coin-op games. It was viewed by many as a harbinger of the future condition of the industry.

The coin-op business has been in serious trouble during the past year or so. According to *The Los Angeles Times*, annual sales of new coin-op games have dropped from one billion dollars to \$500 million, a precipitous 50% decline

which would prove highly damaging to any industry.

An Atari spokesman estimated that arcade revenues have decreased 15 to 20% over the past year. A quick stroll through most arcades across the country would corroborate this guess; it doesn't take an industry expert to notice that there are many fewer people playing video games in the arcades than there were a year ago. Many in the industry feel that the hectic Pac-Mania of 1980-82 was transient. A recent survey revealed that 38% of the arcade operators polled thought that the arcade boom had, in fact, been a fad.

Over the past several months, a state-of-the-art coin-op game, Dragon's Lair, was introduced into the arcades. The laser disc technology of Dragon's Lair permits cartoon-like graphics to be displayed on the screen. The game became an enormous hit and immediately soared to the top of the coin-op game charts. It became so popular that the manufac-

turer, Cinematronics, hasn't been able to meet demand; operators today are waiting impatiently to get their hands on Dragon's Lair units.

Because of the success of Dragon's Lair, it was generally expected that numerous laser disc games would be introduced at the October AMOA. The operators, of course, were hoping that these games would be able magically to lure kids (of all ages) back into the arcades. There was widespread surmise that the October AMOA would provide the key to the salvation of the coin-op industry.

Thus it was with great anticipation that I flew to New Orleans to find out, first-hand, what was happening in the dynamic coin-op industry.

Little did I know that I would be in for a great surprise.

Well here it is, Saturday, October 29, 1983, 8:00 in the morning. We are about to attend The 35th Annual AMOA International Exposition of Games and Music. The show is being held in the

Ken Uston, 2140 Taylor St., #1201, San Francisco, CA 94133.

Coin-Op Industry, continued...

New Orleans Rivergate auditorium, officially called The Port of New Orleans Exhibition Center.

There are over 170 exhibitors, including the coin-op giants, Bally Midway, Atari, Williams, Nintendo, Mylstar, and Centuri. Almost 20 seminars are being held to help arcade operators run their business, covering such diverse subjects as Are You Paying The IRS Too Much? (aren't we all?) and Pinball Merchandising: an Alternative.

I am now waiting to be processed at the Registration Desk, and already my juices are flowing as I hear the sounds of space battles, maze chases, and airplane bombing emanating from the adjacent exhibition hall.

Now it is time to go inside and see what is happening. The hall is large, although not nearly as large as the ones at CES, with nice wide carpeted walkways. As I look around, I spot all the familiar names, Bally Midway, Stern, Rockola — and, as always, there is the huge Atari logo suspended from the ceiling of the auditorium over the Atari booth.

Luckily, because the folks at Exidy gave me one of their exhibitor badges, I have been allowed to enter two hours in advance ostensibly to set up. What I am going to do, of course, is try to get two

solid hours of game play, unimpeded by the crowds, which have yet to arrive.

The Games

Over the two days I was at AMOA, I was able to get in about 12 hours of game play. This section describes and evaluates the games that were introduced. I'll start with the game I rated as Best of Show and then discuss the others, in descending order of (my) interest.

But first, an important proviso (a fancy term for cop-out): There were many games to review. I have found that I usually don't really understand the full scope of a game until I have played it for at least two or three hours; sometimes the process takes far longer.

In 12 hours of play I couldn't possibly do justice to all the games. So, in many cases, I am passing on to you only first impressions.

It is also important to recognize that we all have game preferences. I, for example, love mazes, particularly Pac-Man-type games and hair raising shoot-'em-ups. Climbing games generally turn me off. I prefer games with simple con-

trols (e.g., a joystick and firing button) as opposed to games such as Defender with six separate controls and StarGate with seven.

With these qualifications, I have ranked the games by assigning to each the number of hours I would probably want to spend playing them. I estimated that the top game would capture 250 hours of my time; the games that I found least appealing were assigned zero hours.

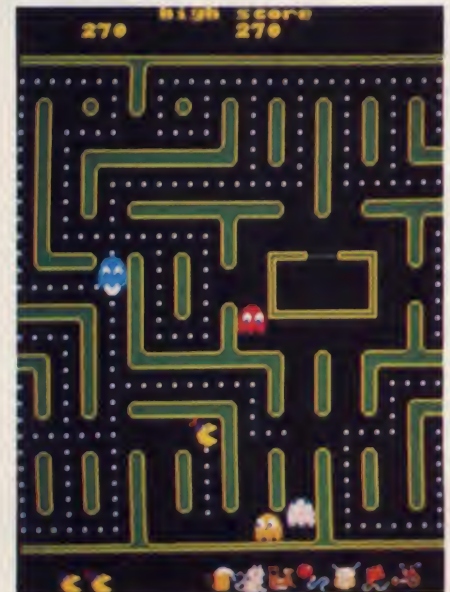
Now don't get mad if my opinion doesn't agree with yours. People vary in their taste for video games just like they do for talk show hosts, cars, clothes, and movies. You may not agree with me. But I do promise that I have given you my totally honest opinions, biased as they might be.

While most of the games discussed below were introduced as "new" at the show, some had made prior appearances in arcades. Some (including M.A.C.H. 3, Discs of Tron, Bega's Battle, and Elevator Action) had even been listed on game charts prior to AMOA.

Pac-Man Jr.

I was totally taken by (delightful) surprise when I saw Bally's newest Pac-Man variation. The maze chase, called Pac-Man, Jr. has incorporated several novel Pac-variations:

- A scrolling screen. There are about twice as many dots to eat as in the conventional Pac-Man games.
- The fruits are dangerous. They eat the energizers they encounter. Worse



Pac-Man Jr.

yet, they convert the dots into larger dots which slow down Pac-Man Jr., making him more likely to be caught by the pursuing monsters. (Game tip: eat the fruits early!)

Ratings of games at October 1983 AMOA.

Game	Manufacturer	Number Of Hours
	★ ★ ★ ★	
1. Pac-Man Jr.	Bally	250
2. Blaster	Williams	200
3. Mr. Do's Castle	Universal	175
4. Star Rider (LC)	Williams	150
5. TX-1	Atari	150
	★ ★ ★	
6. Pole Position II	Atari	100
7. Astron Belt (LC)	Bally	100
8. Cube Quest (LC)	Simutrek	80
9. M.A.C.H. 3 (LC)	Mylstar	70
10. Discs of Tron	Bally	70
11. Elevator Action	Taito	60
12. Body Check Hockey	Eastern Micro Elect.	60
	★ ★	
13. Spy Hunter	Bally	50
14. Bouncer		40
15. Track And Field	Konami/Centuri	40
	★	
16. Major Havoc	Atari	30
17. Marvin's Maze	SNK Electronics	25
18. Donkey Kong 3	Nintendo	15
19. Bega's Battle (LC)	Data East	10
20. Badlands (L)	Centuri	5
21. Cliff Hanger (L)	Stern	0
22. Laser Gran Prix (LC)	Taito	0
23. Goal To Go (L)	Stern	0

(L) = Laser only

(LC) = Laser and superimposed computer graphics

Table 1.

COMPUTERS ARE CREATING JOBS FOR NRI-TRAINED PEOPLE.

IF YOU'RE SERIOUS ABOUT MAKING MONEY IN MICROCOMPUTERS, NRI IS SERIOUS ABOUT SHOWING YOU HOW.

The U.S. Department of Labor projects job openings for qualified computer technicians will soon double. International Resource Development, Inc., estimates a 600% increase in these jobs in a decade. And most of these will be new jobs, created by the expanding role of computers.

NEVER HAS THERE BEEN A FASTER-GROWING FIELD OF TECHNOLOGY.

Many people are afraid of losing their jobs to computers, but thousands of jobs will be created for those who are prepared to meet the challenge.

With NRI training, you'll be prepared. You can have a profitable, exciting future as an expert who can handle the operational, programming and tech-

nical aspects of all kinds of microcomputers and microprocessors.

LEARN IN YOUR SPARE TIME.

NRI trains you in your own home, at your convenience...no classroom schedules to meet, no need to quit your job. As a class of one with complete course materials and the backing of a staff of professional electronics instructors, you'll get extraordinary hands-on training on the latest, most popular microcomputer: the new TRS-80™ Model 4 with Disk Drive. Designed to perform diverse personal and business functions and accept more software, the TRS-80 is yours to keep.

LEARN HOW TO USE, PROGRAM AND SERVICE STATE-OF- THE-ART MICRO- COMPUTERS.

Through your carefully designed NRI course, you'll get a wealth of practical

experience. You'll build circuits... from the simplest to the most advanced...with your NRI Discovery Lab.® You'll use a professional 4-function LCD digital multimeter for analysis and troubleshooting. With NRI training you'll explore your computer's registers, memory and input-output ports. You'll even write programs to control the circuits you've designed and built. You'll perform hundreds of challenging experiments, always backed by a full-time faculty ready to help you personally.

When your NRI training is complete, you'll be a computer technician, ready for your first job — servicing, testing or programming all types of microcomputers — in a rewarding and challenging new career.

THE CATALOG IS FREE. THE TRAINING IS PRICELESS.

Send the coupon today for your FREE 104-page catalog. It's a valuable guide to opportunities and training in the high-tech revolution. You'll see how easily you become part of the growing high-tech world of microcomputers. If the coupon has been removed, write: NRI, 3939 Wisconsin Ave., Washington, DC 20016.



Your NRI course will include the new TRS-80 Model 4 with Disk Drive or the TRS-80 Color Computer with NRI Computer Access Card...plus a professional LCD multimeter, NRI Discovery Lab and hundreds of demonstrations and experiments. It's all yours to keep.

TRS-80 is a trademark of the Radio Shack division of Tandy Corp.



NRI School of Electronics
McGraw-Hill Continuing
Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

We'll give you tomorrow.

The catalog is free.

The training is priceless.

Please check for one free catalog only.

- ☐ Industrial Electronics
- ☐ Computer Electronics including Microcomputers
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Electronics Design Technology
- ☐ Digital Electronics
- ☐ Communications Electronics
- ☐ FCC Licenses • Mobile • CB • Aircraft • Marine
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration & Solar Technology
- ☐ Building Construction

Name (Please Print) _____ Age _____

Street _____

City/State/Zip _____

Accredited by the Accrediting Commission of the National Home Study Council 175-024



All career courses approved under GI bill.
☐ Check for details.

MORE OF THE BEST FOR LESS

APPLE

ASCII Express Pro (SWD)	95.95
Word Star w/free CPM (Micropro)	350.00
Cubit (Micromex)	29.95
Money Street (Computax)	79.95
Infidel (Infocom)	36.95
Tax Preparer (Howard)	195.00

IBM

Math Blasters (Davidson)	38.95
Word Attack (Davidson)	38.95
Game Show (CAI)	30.95
Wizard of Words (CAI)	30.95
Tax Manager (Howard)	195.00

SPECIALS

COMMODORE 64

Lode Runner (BB)	26.95
Rescue Squad (Muse)	23.95
Face Maker (Spinnaker)	26.95
Practicale-64 (MSI)	39.95
Multiplan (HESI)	79.95
Prof. Tour Golf (SSI)	30.95
Bank Street Writer (BB)	54.95

ATARI

Q-Bert (Parker)	38.95
Star Trek (Seger)	30.95
Popeye (Parker)	38.95
Nite Strike (TG)	30.95
Song Writer (Scarboro)	30.95
Ultimate III (Origin)	43.95
Ultimate I (On Line)	28.95

APPLE GAMES

Broderbund Software

The Arcade Machine	59.95	41.95
Choplifter	34.95	24.95
Serpentine	34.95	24.95
AE	34.95	24.95
Lode Runner	34.95	24.95
Spare Change	34.95	24.95

Datamost

Aztec	39.95	27.95
-------	-------	-------

Datasoft

Zaxxon	39.95	27.95
Pooyan	29.95	20.95

Epix/Automated Simulations

Temple of Apsah	40.00	27.95
Jumpman	40.00	27.95
Oil Barons	99.00	69.00

Electronic Arts

Hardhat Mac	34.95	27.95
Archon	39.95	31.95
Axis Assassin	39.95	31.95

Hayden Software

Sargon III	49.95	37.95
------------	-------	-------

Infocom

Zork I, II, III	39.95	27.95
Deadline	49.95	34.95
Starcross	39.95	27.95
Suspended	49.95	34.95
Witness	49.95	37.50
Planetfall	49.95	37.50
Enchanter	49.95	37.50

Microlab

Miner 2049er	39.95	27.95
Death in the Caribbean	35.00	24.95
Highrise	30.00	21.95
Scrapers Caper	40.00	30.00

Muse Software

Castle Wolfenstein	29.95	20.95
Titan Empire	34.95	24.95

Odesta Corporation

Chess	69.95	49.95
Odin	49.95	37.95

Origin Systems

Ultima III	54.95	43.95
Caverns of Calisto	39.95	31.95

Penguin Software

Pie Man	19.95	15.95
Transylvania	19.95	15.95
The Quest	19.95	15.95
Minute Man	19.95	15.95

Quality Software

Beneath Apple Manor Hi Res	29.95	21.95
----------------------------	-------	-------

Sierra On-Line Inc.

Ultima II	59.95	41.95
Jawbreaker (New Version)	29.95	20.95
Dark Crystal	39.95	27.95

Sirius Software

Bandits	34.95	24.95
The Balde of Blackpool	39.95	27.95
Critical Mass	39.95	27.95

Sir-Tech Software

Wizardry I	49.95	34.95
Wizardry II	34.95	24.95
Wizardry III	39.95	27.95
Police Artist	34.95	24.95
Star Maze	34.95	24.95

Strategic Simulations

Computer Ambush (2nd Edition)	59.95	41.95
Germany 1985	59.95	41.95
North Atlantic 86	59.95	41.95
Geopolitique 1990	39.95	27.95
Battle of Normandy	39.95	27.95
Knights of the Desert	39.95	27.95
Ringside Seat	39.95	27.95
Broadsides	39.95	27.95
Eagles	39.95	27.95

Sublogic Corporation

Flight Simulator	33.50	23.95
Night Mission Pinball	39.95	27.95
Space Vikings	49.95	37.95

APPLE BUSINESS/UTILITIES

Artsci

Magic Window II	149.95	104.95
Magicalc	149.95	104.95

Ashton-Tate

dBase II (Z-80 Required)	700.00	490.00
Friday (Z-80 Required)	295.00	206.95

Beagle Brothers

Tip Disk #1	19.95	15.95
Utility City	29.95	20.95
Flex Text	29.95	20.95
Frame Up	29.95	20.95
Typefaces (Needs Apple Mechanic)	19.95	15.95
Pronto Dos	29.95	20.95
GPLe	49.95	37.95
Alpha Plot	39.95	27.95
Apple Mechanic	29.95	20.95
DOS BOSS	23.95	19.95
Double Take	34.95	24.95

Business Solutions

Incredible Jack	179.00	134.95
-----------------	--------	--------

Central Point Software

Copy II+	39.95	31.95
----------	-------	-------

Continental Software

The Home Accountant	74.95	52.50
FCM (Filing/Mailing)	99.95	69.95

Eagle Software

Money Decisions (Volume I)	199.00	149.95
Money Decisions (Volume II)	229.00	171.95
Tax Decisions	229.00	183.95

Hayden Software

Applesoft Compiler Plus	99.95	69.95
-------------------------	-------	-------

Microsoft

Multiplan (Z-80/Apple DOS)	275.00	192.50
Multi-Tool Financial Statement	100.00	80.00
Multi-Tool Budget Analysis	150.00	112.50

Micro Sparc

GALE	49.95	37.50
Macrosoft	69.95	55.95
The Assembler	69.95	55.95

Pear Systems

Stock Portfolio Evaluation System	600.00	500.00
-----------------------------------	--------	--------

Penguin Software

Complete Graphics System	74.95	53.95
The Graphics Magician	59.95	41.95

Sensible Software

Sensible Speller	124.95	93.95
Back It Up III	74.95	59.95
Multi Disk Catalog	25.00	20.00
Super Disk Copy II	30.00	21.00

Sierra On-Line Incorporated

Screenwriter II	129.95	90.95
-----------------	--------	-------

Silicon Valley Systems

Word Handler	59.95	49.95
List Handler	49.95	39.95

Software Publishing Corporation

PFS-File	125.00	87.50
PFS-Report	125.00	87.50
PFS-Graph	125.00	87.50
PFS-Write	125.00	87.50

Southwestern Data Systems

ASCII Express Pro	149.95	104.95
Munch A Bug	49.95	34.95
Merlin	64.95	45.50
Printographer	49.95	34.95
Assembly Lines	19.95	15.95

Stoneware

DB Master Utility #1	129.00	97.50
DB Master Utility #2	129.00	97.50
DB Master (Version 4.0)	350.00	262.50

Visicorp

VisiFile	250.00	174.95
VisiSchedule	300.00	210.00
Business Forecasting Model	100.00	80.00
Visicalc IV	250.00	174.95

IBM

Serpentine	34.95	27.95
Lode Runner	34.95	27.95
Early Games	29.95	23.95
Early Games Mathmaker	29.95	23.95
Quizagon	39.95	31.95
Spellcuber	39.95	31.95
Crypto Cube	39.95	31.95
Bottom Line Strategist	400.00	320.00
Friday (MS-DOS)	295.00	235.00
CDEX Training for VisiCalc	69.95	55.95
CDEX Training for IBM PC	69.95	55.95
CDEX Training for Multiplan	69.95	55.95
Multiplan	295.00	265.00
Multi-Tool Word	275.00	220.00
Multi-Tool Word	395.00	315.00

COMMODORE 64

Early Games for Young Children (Disk)	29.95	23.95
---------------------------------------	-------	-------

Hayden

Micro Addition (Disk)	29.95	23.95
Micro Division (Disk)	29.95	23.95
Micro Multiplication (Disk)	29.95	23.95
Great MA to CA Race (Disk)	34.95	27.95
Monkey See Monkey Spell (Disk)	29.95	23.95

Lightning Software

Master Type (Disk)	39.95	31.95
--------------------	-------	-------

Odesta

Chess (Disk)	69.95	55.95
--------------	-------	-------

Sega

Star Trek (Cart)	39.95	31.95
Buck Rogers (Cart)	39.95	31.95

Spinnaker

Alphabet Zoo (Disk/Cart)	29.95	23.95
Story Machine (Cart)	39.95	31.95
Delta Drawing (Cart)	39.95	31.95
Delta Music (Cart)	39.95	31.95

ATARI SOFTWARE

Donkey Kong (Cart)	44.95	39.95
--------------------	-------	-------

Big Five Software

Miner 2049er (Cart)	49.95	39.95
---------------------	-------	-------

Epix/Automated Simulations

Temple of Apsah (32K Disk)	40.00	32.00
Crush, Crumble, Chomp (32K Disk)	30.00	24.00
Jump Man Jr (Cart)	40.00	32.00

Gamestar

Star Bowl Football (Disk)	31.95	25.95
Star league Baseball (Disk)	31.95	25.95

For Mail Orders: Include your selection(s), name, address, phone number along with your check, money order or credit card number and expiration date. Please include \$3.00 for shipping & handling (heavy items, hardware and foreign orders extra). California residents add 6 1/2% sales tax.

FOR ORDERS ONLY
800-942-2058



In California, Alaska & Hawaii Call
(415) 237-4406

In Bay Area visit

SOFTWARESOLUTIONS

NONAGON SOFTWARE

11185 San Pablo Ave, El Cerrito, CA 94530
(415) 237-5257 Hrs: M-Sat 10 a.m. to 6 p.m.

P.O. Box 1486

El Cerrito, CA 94530

CIRCLE 147 ON READER SERVICE CARD

*Pac-Man Jr.*

shoot-'em-up to date. Blaster is totally addictive. The graphics are so convincing that you feel you are actually traveling through space. Blaster poses several different types of challenges to the player: shooting, of course; traversing a sort of space slalom; picking up space travelers; and others.

After completing 30 waves, you reach Paradise, which will prove to be a truly exciting place for most. I won't spoil it by revealing what Paradise is, but I will give you a clue; it was undoubtedly created by an MCP.

The controls are simple, yet the action is exciting. The color, sound, and detail of the objects on the screen are all fabulous, even though the game isn't a laser game. And it has that &*&*&* factor when your man is destroyed—the critical element that keeps most of us

• There are six energizers, instead of four.

Pac-Man Jr., being a junior, is smaller than either Pac-Man or Ms. Pac-Man and has a little beany on his head. The "symbols" pick up on the junior theme, as shown in Table 2.

Board	Symbol	Points
1st	Bicycle	100
2nd	Kite	200
3rd	Drum	300
4th	Balloon	700
5th	Locomotive	1000
6th	Dog	2000
7th	Ice cream soda	5000

Table 2.

Evaluation: The game is highly playable. I wonder, however, if some players might find the many extra dots on each board too tedious to want to clear. Despite this, I predict that Pac-Man Jr. will be near the top of the charts soon after it is released.

Blaster

My second choice is Williams' Blaster, in my opinion the ultimate space

*Blaster**Blaster*

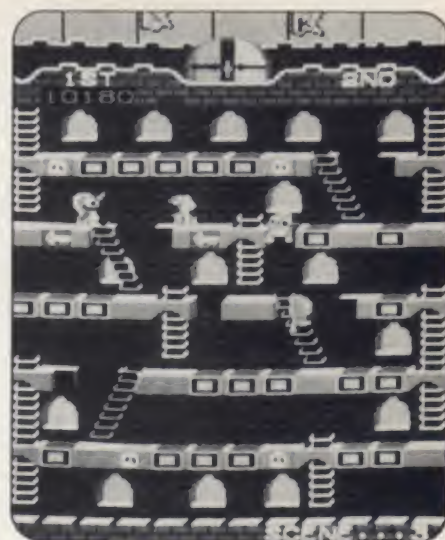
wanting to play over and over again.

Evaluation: Blaster is a definite top-of-the-charts-soon-after-release game.

Mr. Do's Castle

Mr. Do's Castle is Universal's sequel to Mr. Do, (a Dig Dug type climbing game) that has appeared on the charts. About the only relationship between Mr. Do's Castle and Mr. Do is the cute little character, Mr. Do.

Mr. Do climbs ladders and hammers

*Mr. Do's Castle*

pursuing unicorns into oblivion. He also pounds blocks so they drop onto unicorns standing on girders below.

Evaluation: Despite my aversion to climbing games, I rate Mr. Do's Castle, a non-laser climbing game, highly, even though it is not even an advance in the state-of-the-art. The reason? Mr. Do's Castle is highly playable. It is not hard to learn, and you get the irrepressible desire to advance to later screens. The game theme and graphics are cute and humorous. Playing Mr. Do's Castle just gives you a good feeling. How's that for being specific?

Watch the charts for this one, too.

Star Rider

This is the first laser disc game on my AMOA "charts." Ironically, it is not the laser graphics that qualify Star Rider; it is the playability.

Star Rider is—would you believe?—a space motorcycle racing game. The controls are authentically incorporated in the handlebars: the throttle is activated

*Star Rider*

Coin-Op Industry, continued...

by rotating the right handlebar; the brakes and turbo (for extra power) buttons are mounted on the left handlebar.

The game has stunning graphics. The dashboard even has a rear view mirror with graphics just as effective as those on the main game screen. The laser background adds further realism, as does the three-channel stereo sound system.

Star Rider was a hit at the show. And the game wasn't even completed! To be added are pursuing motorcycles, which will make the rear view mirror an important survival tool.

Evaluation: I can't wait for Star Riders to show up in the arcades so I can put in my 150 hours—or more! There is no question about it, this game is highly addictive.

TX-1

I love technology. TX-1 is a driving game with not one, but three screens, mounted side-by-side which gives a super-realistic wraparound display. The graphics are fabulous—even more effective than those in the Atari mega-hit, Pole Position.

When you drive through the tunnels that periodically appear on the screen, the sounds of your engine are modified to give a muffled echo effect. When you pass other cars, or vice versa, you hear the roar of the competing vehicles.

As your vehicle changes direction, the background on all three screens scrolls accordingly. When you pass road signs, trees, windmills, and other objects, they initially appear on the sides of the center screen. Then the peripheral screens pick up the objects, as they zoom past your vehicle. If you oversteer, your car spins out.

Once you are inside the enclosed cabinet, the sound is not to be believed. The cabinet even vibrates.

That's the good news. The bad is that TX-1 will probably cost us at least 50

cents per play. Perhaps that is only fair because TX-1 games are going to set the arcade operators back about \$5000 apiece. I may be old-fashioned, but I think arcade games should cost a quarter—period.

Evaluation: There is no question that TX-1 was one of the highlights of AMOA. One can't help but ask, "Why on earth is Atari coming out with another driving game to compete with its highly successful Pole Position?"

I think I know the answer. TX-1 was originally introduced at a recent coin-op show in Japan. At the time, it had not been licensed by an American coin-op manufacturer. I surmise that Atari licensed TX-1 so that other manufacturers, such as Bally and Williams, would not do so and make Pole Position (or Pole Position II—more on this game later) obsolete.

If this theory is correct, Atari may delay the introduction of TX-1 as long as possible, to allow them to derive maximum revenues from their Pole Position games.

I asked an Atari spokesperson what specifically TX-1 adds to the Atari line that Pole Position doesn't, other than the three screen feature.

She said, "Frankly, it doesn't add that much more."

At any rate, there is no question that Atari has a lock on coin-op driving games.

The most dramatic new feature in Pole Position is that it offers the player a choice of four courses.

Pole Position II

Atari also introduced Pole Position II (PP II) at AMOA. PP II will be available in the form of a conversion kit. This means that the operators will not have to buy a complete new game, cabinet and all, but only a kit to convert existing Pole Position games to PP II.

Conversion kits please operators to no end. First, they cost less—usually under \$1000. Second, operators can expense them, deducting their total cost in the year of purchase. Complete games, on



Pole Position II

the other hand, must be depreciated over five years. (Five years, in my view, is unfair because most games remain popular for only a year or two at most. Would you believe that the Grand Daddy of arcade games, Space Invaders, is only about four years old?)

The most dramatic new feature in Pole Position is that it offers the player a choice of four courses (versus only one in Pole Position). Other improvements include more realistic explosions when the car crashes—tires and other car parts hurtle through the air upon impact.

Astron Belt

Astron Belt is Bally's first laser disc game. The game combines a laser back-



TX-1

QUEST FOR TREASURES

- ATARI
- APPLE
- COM 64
- COLECO

By Sydney

FROM THE FIRST MAN...
THE LAST WORD
IN VIDEO GAMES



TM designates a trademark of Sierra On-Line, Inc. © 1983 Sierra On-Line, Inc. or Sydney Development Corp. B.C. characters © Field Enterprises, Inc. 1983. Manufactured under license from Coleco Industries, Inc.

CIRCLE 165 ON READER SERVICE CARD

Coin-Op Industry, continued...

ground with real-time player controlled objects in the foreground. (These games are called interactive laser disc games.)

The laser background consists of realistic space scenes—cratered lunar surfaces, space canyons, and so on. You man a powerful-looking space vehicle that fires missiles at enemy aircraft that are also laser-realistic.

Astron Belt is playable and addictive. It will be the rare player, who upon having his aircraft destroyed, won't want to play again... and again... and again.

I believe Astron Belt has a serious shortcoming, however. When enemy aircraft are destroyed, the resulting napalm-like, bright red explosions, which cover the entire screen, are to me a bit macabre. We occasionally see burning planes going down in smoke, and we can't overlook the fact that other human beings (not space aliens or Martians) are trapped inside the burning cockpits, frying.

While I am not a political activist, I personally believe that Astron Belt exploits destruction and violence. I can't help imagining, that, among the few million kids who will play Astron Belt, reveling in the destruction of other humans, there may be one someday who will be in control of (and perhaps more prone to push) The Red Button, to the detriment (and that's putting it mildly) of humanity.

OK. Enough morbid talk.

Cube Quest

Cube Quest from Simutrek was a disappointment. I had tested a prototype of this interactive laser game in advance of AMOA at Simutrek's Hayward headquarters, and felt then that the game had enormous potential. For some reason the game didn't turn me on at AMOA, and I am trying to figure out why.

When I play-tested the Cube Quest prototype, a joystick and firing button controlled the action. That, I liked. It was all they could do to drag me away from the game. At the show, the game control was a trak ball, which didn't

seem nearly as much fun (I freely admit a prejudice against trak ball controls except in special cases, such as Centipede and Missile Command).

But the controls weren't the only problem. What also bothered me was that it was difficult to locate your spaceship against the multi-colored laser backgrounds (there are 54 of them, many of which are gorgeous). I didn't notice this on the prototype, and suspect the reason is that when I played the game in Hayward, the full array of colorful backgrounds was not yet available.

I spent a great deal of time play-testing Cube Quest to make sure my second thoughts were valid. As I played, people watched, often preferring to let me test the game rather than do it themselves (in and of itself, a bad sign). The most frequent comment I overheard was, "What's going on?" In other words, the spectators couldn't figure out what the point of the game was. That is another bad sign. (I believe that simplicity of play and ease of understanding are two important ingredients in successful game design.)

It saddens me to say this. The



The invitation was a shameless tease. On the front, in big letters, it said, "What's he up to now?" On the inside was a blackjack (an ace and a jack) and a huge yellow Pac-Man, chasing another disc, the Yale University logo. The text read, "Come join Ken Uston, Blackjack King, Pac-Master, Video Game Guru, for fun and games at the staid old Yale Club of New York."

When we entered the huge main dining room of the Yale Club, carpeted in blue (of course) and full of blue upholstered furniture, we knew something different was going to take place.

Formally dressed croupiers dealt cards to players crowding around blackjack tables. In one corner of the huge room, the familiar sounds of "Wocka, wocka" emanated from two Ms. Pac-Man arcade machines. Sol Yaged and his All-Stars, a Dixieland quartet that has been heard at jazz joints in New York City from the Metropole to the Red Garter, was blasting out "When The Saints Go Marching In." As we signed in, we were given a burgundy velour bag, inside of which was a wood and metal yoyo, engraved, "Fun and Games."

Ken was decked out in a Brooks Brothers suit, unusual apparel for him, to say the least. When he worked at the *Creative Computing* offices last year, doing his book on home computers, he usually wore jeans and a Space Invaders T-shirt. For formal occasions, he would put on a polo shirt.

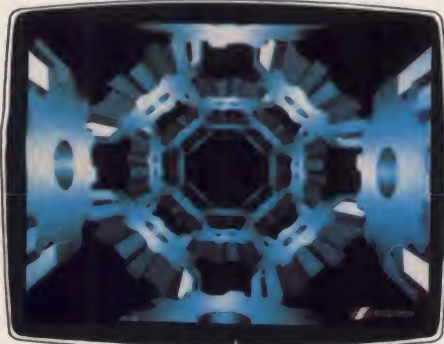
Later Ken got up on the stage and gave a little speech. He told us some "war stories" from his blackjack days, and dis-

cussed some of the teammates he had met along the way, which he said would have "later significance." Then he talked about the development of the personal computer and video game industries, starting with the two Steves in a garage (Jobs and Wozniak) and the pioneering Odyssey game system.

Then the corporate maverick, who left his job as Senior Vice President of the Pacific Stock Exchange years ago to play blackjack full-time, announced that he has formed a company, called Fun and Games, which will write a series of computer books and software instruction manuals and design video games and other software.

He announced that Fun and Games has entered into agreements with four companies: with Prentice-Hall to produce a seven-book series of computer books; with Epyx, to produce games and other software; with Screen-play, to produce game instruction manuals; and with New American Library, to prepare a book on the Coleco Adam.

Then he told us that Fun and Games has five principals, all of whom come from the world of blackjack and/or gambling. Ron Karr and Bob Polin are both former blackjack professionals (Bob designed the best-selling *Blue Max*, for Synapse Software). Roger Dionne has written dozens of stories about gambling (including several on Ken) and several books on poker and video games. Inga Chamberlain, who is also Ken's girlfriend, is a former pitboss at the Tropicana in Atlantic City.



Cube Quest

Simutrek people are nice guys. But I must say that Cube Quest pales in comparison to other games introduced at AMOA.

M.A.C.H. 3

M.A.C.H. 3, an interactive laser game, is a visual experience *par excellence*. On the screen of this aerial challenge, we see real-life backgrounds, brought to us through the magic of laser disc technology. We soar over mountains, harbors, bridges, and dams. You feel like Superman, flying over all those sights below. M.A.C.H. 3 is the most

realistic flying game I have seen to date.

There are two game options. You may choose to man a fighter plane, which strafes enemy targets and launches air-to-air missiles, or you can command a bomber, firing missiles and dropping bombs, aiming with the assistance of a bombardier's overhead view of the target below. You control the game using a large joystick with several built-in buttons.

As is the case with other interactive laser games, M.A.C.H. 3 allows you to maneuver screen objects in the foreground in real time. These objects are



M.A.C.H. 3

We collared Ken and asked him a few questions:

Q: Why "Fun and Games?"

A: The basic reason is that the people in our group are here primarily to have fun—to do what they want to do in life. Sure, we expect to make the money to satisfy our financial needs. But all of us, to a person, are motivated far more by doing something we enjoy doing, rather than just chasing the buck.

A second reason for the Fun and Games name is that, among other things, we're designing video games and other software that will be fun-to-play.

Q: I thought you always wanted to avoid being in a business?

A: I did. The thing I really disliked about being in business was the corporate hierarchy—the clothes, the having lunch with people you didn't want to have lunch with.

In Fun and Games, there is little of that. Sure, I direct what we do—there's got to be a leader. But we are all doing what we want to do, independent of some stuffy board of directors calling the shots. We do have meetings—to get the best ideas from everyone. But there are no bankers or venture capitalists to report to or dress up for.

Q: But you're wearing a suit tonight.

A: Like the invitation says, it's the "staid, old" Yale Club. In fact, my Mom brought down 30 of my Dad's ties so members of the working press and others could get in.

Q: Can a small company make it in this business?

A: Not only can a small company succeed, we feel we're in a stronger position than the big outfits. Look at the current shake-out and who the major shakees are: Imagic, TI, Mattel, possibly Atari—even Activision is in trouble.

The big guys move slowly; they can't change direction fast enough. And it's a truism that in this industry, you must be able to move on a dime. In fact, lots of company heads even say that, but they still get in trouble because they don't follow that rule.

Smallness (assuming of course, you have the ideas and the capital—which we do) is OK in this business. Of course, you need manufacturing and marketing—but this we get from the companies we work with, like Prentice-Hall, Epyx, and New American Library.

Q: Isn't it foolhardy to enter the games business when so many game companies are in trouble?

A: On the surface, it would appear that

way. But the industry's problem has not been just too many games. The basic shortcoming has been not enough *really* good games. Look at the last CES. Dozens of "me too" games were introduced—the public doesn't want those.

But when a *River Raid*, *Megamania*, or *Zaxxon* comes along, the players gobble it up.

Game companies often don't see the forest through the trees. Lots of them don't even play video games. How can they know what an addictive game is? Me, I play four or five hours a day, every day—at home and in the arcades.

Let me give you an example of industry myopia. Last month I visited the AMOA in New Orleans. All the coin-op companies jumped on the laser bandwagon, thinking players want laser games. Wrong! Players want *playable* games. Of the top five AMOA games, only one was a laser—and the fact that it was a laser was only incidental to the game play. The games I ranked as the five worst at AMOA, were *all* lasers.

Q: What will Fun and Games be doing a year from now?

A: I haven't the vaguest. Anyone in this business who tries to predict what he will be doing in a year, or even in six months, is kidding himself. Sure, venture capitalists like business plans, but things are changing far too fast to etch anything in stone.

Look at Imagic and TI. In four years or less, they went from nothing—in the home industry—to huge suppliers—and back—to virtually nothing again. The same with Osborne. In most other industries this cycle can take decades.

So we are rolling with the punches. What with \$1 32-bit chips, voice recognition devices, and who knows what else, there's no telling what we'll be writing books about or what software we'll be designing next year. No doubt we'll soon be helping people get used to software that has totally obsoleted *Lotus 1-2-3* and *Context MBA*, and hardware that has made buggy whips of the IBM PCjr and the MacIntosh.—JJA



The fun and games team.

Coin-Op Industry, continued...

superimposed upon the laser background. Game play is even more dramatic inside the enclosed sitdown cabinet version in which the screen is larger and the sounds far more explosive.

When a target is hit, the resulting bright red explosions are convincing—for a while. However, after the superimposed explosions fade away, the targets which were supposedly destroyed, occasionally reappear in the background, undamaged. This detracts considerably from the realism of the game.

M.A.C.H. 3 has another serious shortcoming. The game play is confusing. You must zero in on rectangular viewfinders on the screen. A number of players at the show tried in vain to figure out how to aim properly.

Evaluation: I believe that M.A.C.H. 3 will get lots of play—far more than Dragon's Lair. But I also suspect that M.A.C.H. 3 will wear thin before very long (as contrasted with Blaster or Mr. Do's Castle, the interest in which, I believe, will last far longer).



M.A.C.H. 3

Discs Of Tron

Discs of Tron is basically a lethal game of frisbee. You are Tron; your goal is to destroy your computer controlled opponent, Sark, by hurling discs at him. The contest takes place inside a futuristic looking handball-type court.

You try to knock Sark off his platform by striking him with the deadly discs. Sark, of course, tries to do the same to you, hurling a variety of missiles from his arsenal.

The graphics are futuristic and effective. The game comes either as a stand-up model or as a sit-down enclosed cabinet (it seems that cabinets are becoming popular in coin-op games).

The controls are a bit complex. Most players will probably get used to them after only a few games. The four controls are:

- A rotary knob on the left side of the control panel, used to aim the discs.
- A joystick to maneuver Tron.
- A trigger to launch discs.
- A button on the joystick to put up a



Discs of Tron

protective shield, so Tron can deflect objects that are thrown at him.

Evaluation: I am lukewarm about the Discs of Tron, primarily because of the multiple controls. There is an element of competition in the game which may cause the game to grow on players: Sark laughingly mocks you when he knocks you down, and when you zap him, he threatens, "You'll regret this."

Several people I talked to at the show enjoyed playing Discs of Tron. I suspect that this game, while not a mega-hit, will have quite a few devoted followers. (Discs of Tron is not a new AMOA introduction; I had spotted it in arcades before the show.)

Elevator Action

You are a top-secret agent who must sneak through a heavily guarded enemy defense building and steal secret docu-



Elevator Action

ments. You must progress through the building taking elevators (à la Keystone Kops), shoot enemy agents, and pick up files hidden behind special red doors. While far from a state-of-the-art

endeavor, Elevator Action is playable and mildly addictive. (The game play reminds me of the fairly enjoyable coin-op game, Mappy, from Bally).

Another 125 hours shot.

Body Check Hockey

Body Check Hockey is another definitely not-state-of-the-art offering, but it is still fun to play. You force your opponents into the walls of the playing arena, just as hockey players body check each other. A hockey puck is also pushed around the screen for additional leverage against the opposing players. While I can't call it addictive, I can say that Body Check Hockey is pleasant to play—a game I would probably spend about 50 hours fooling around with.

Spy Hunter

Spy Hunter is one of the very first driving game shoot-'em-ups. It is constructed around the well known James Bond driving theme, in which Our Hero is in a car pursued by villains, including tire-slashing enemy vehicles and threatening helicopters. The hero's car has an 800-horsepower turbo fuel-injected engine and is, of course, specially equipped with all kinds of advanced equipment, including smoke screen emitters, oil slick ejectors, and even surface-to-air infrared heat-seeking missiles. The theme song of Spy Hunter, appropriately is The Theme from Peter Gunn.

At the start of the game, your car emerges from the back of a truck. After out-maneuvering and destroying various enemy vehicles, you must maneuver your car up a ramp, and back into the rear of the truck.

The aerial view of Spy Hunter is not as dramatic as the driver point-of-view found in games such as Pole Position and TX-1. Nevertheless, the game is fun to play—for a while.

Bouncer

Bouncer has fine, detailed graphics. The action takes place in one of my favorite places, a barroom. A big, fat bouncer is activated by the player. The bouncer's rather tasteless mission is to clobber patrons, most of whom are decidedly smaller than himself, and expel them from the bar.

Not to be a moralist, but the bouncer displays anti-social tendencies as he stomps on customers, and dribbles their heads (yes, you read it right) as he makes his way to the front door to eject the hapless bouncers. (Question: why bounce a headless person—why not just bury him?)

Bouncer no doubt will be highly popular in redneck bars. Its most fanatic devotees no doubt will be frustrated sadists (you know, the ones who blasted

Peter Fonda off his motorcycle in Easy Rider).

Track And Field

Track And Field reminds me of Activision's quasi-physical home video game, *Decathlon*. You push a firing but-



Track and Field

ton as fast as you can to make the on-screen character run. You depress a second button to make the character jump and throw.

From one to four players can play Track And Field. Thus the game has interesting competitive two-man team possibilities. The five Track and Field events are running, long jump, hurdles, hammer throw, and high jump.

Major Havoc

A vector graphics game (à la *Tempest*), Major Havoc combines a space shoot-out and a maze chase. The maze

portion of the game struck me as a poor man's Donkey Kong.

Although the game as a whole didn't appeal to me, some people I met at the Atari booth really liked it. One arcadian with whom I talked, noting my lukewarm reaction to the game proffered,



Major Havoc

"This really is a top flight game. I spent all day yesterday playing it."

I asked him what other games he liked. His answer: *Defender* and *Stargate*.

If you like action shoot-'em-ups with moderately complex controls (a horizontal roller and two firing buttons), you may go for Major Havoc.

Me? I give it 30 hours of my time—tops.

Marvin's Maze

Marvin's Maze is a simulated three-dimensional game, sort of a cross be-

tween *Pac-Man* and *Crystal Castles*. You control a little character who makes dots disappear when he travels over them. He is chased by monsters (who didn't know that?), which can be destroyed when our man runs into (you guessed it) energizing dots.



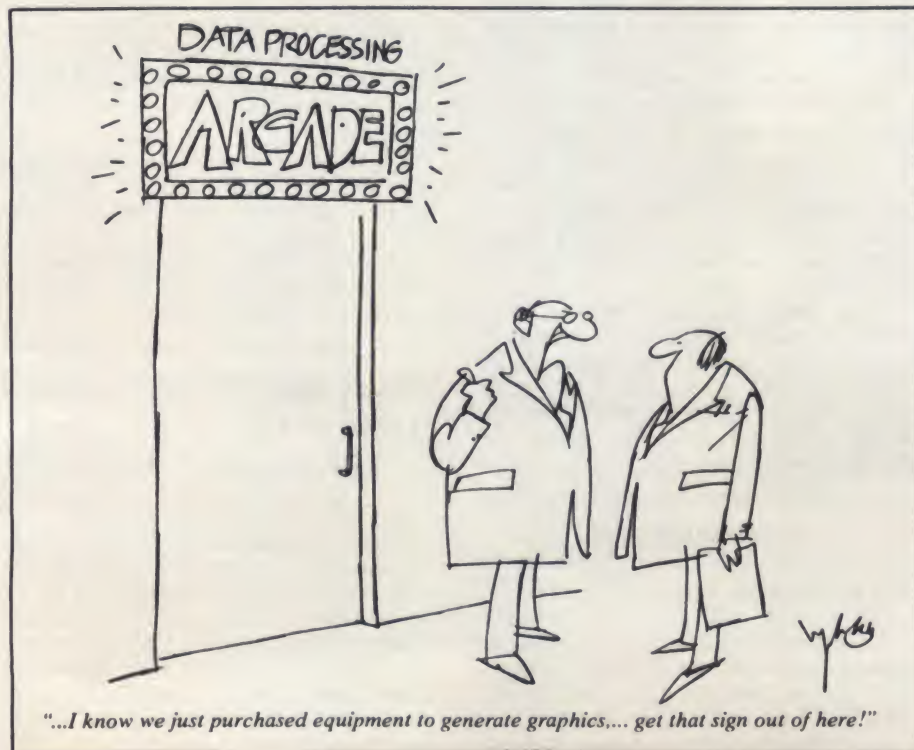
Marvin's Maze

Both my girlfriend and I had a lot of trouble mastering the diagonal controls.

Evaluation: Graphics: A. Idea: B. Playability: C-. You may, however, see a few Marvin's Mazes around since it comes as a conversion kit, as well as a full-blown game.

Donkey Kong 3

Donkey Kong 3, another climbing game, has nice graphics and may appeal



Donkey Kong 3

Coin-Op Industry, continued...

to fans of Donkey Kong, Donkey Kong Jr., and Mario Brothers.

While I am not a devotee of the Donkey Kong series, I discussed Donkey Kong 3 with several people who are. The consensus seems to be that Donkey Kong 3 is not as much fun as its predecessors.

The rest of the games at the show, in my opinion, are strictly forgettitsville. Interestingly, all of them are laser games.

Bega's Battle

You "catch" the heroine of the piece, Luna, and help to save mankind by shooting and destroying descending objects. Other characters from the game periodically come and help you in your efforts.

The theme didn't bother me nearly as much as the game play. There is no doubt that Bega's Battle, an interactive laser game, uses advanced technology. But its playability just doesn't hack it.

Badlands

Advertised as the ultimate laser experience, Badlands sure doesn't get my vote. You shoot the bad guys before they shoot you. You must not shoot too early, and, of course, you are in deep trouble if you shoot too late. Badlands is basically a very expensive test of your reflexes.

Cliff Hanger

Cliff Hanger is a laser game without superimposed computer graphics (like Dragon's Lair). It suffers from the same disadvantages as Dragon's Lair. The de-



Cliff Hanger

lay between screens is too long, and the game deteriorates into strictly a memory exercise, due to the decision-tree nature of laser-only games.

When you lose a life, you see a body swinging from a scaffold. Show attendees must have been turned off by this scene, and said so, because signs prepared by Stern suddenly appeared notifying us that the cadaver-hanging scene could be omitted, if desired,

through some kind of dip switch adjustment.

Laser Gran Prix

The lesson to be learned here: don't display a game until it is ready. Laser Gran Prix is an attempt to superimpose computer graphics on a laser background. It didn't work. The cars look as



Laser Gran Prix

though they are floating down the speedway rather than being driven. The transitional scenes are abrupt and unconvincing. If you steer too far in one direction, your car drops out of sight.

In my opinion, Taito did themselves more damage than good by showing this game to the public prematurely.

Goal To Go

The concept behind this game sounds good on paper:

"How about an interactive laser football game, in which the player can call the plays and see how well he has done, by watching them acted out by real live football teams on the screen?"

Something happened in the transition from idea to game. People (myself included), who tried to play Goal To Go were totally confused about what they were supposed to do. The same old sequence showing the quarterback being sacked, appeared on the screen over and over and over again.

Let's hope this game was a very preliminary prototype. The Stern representative who tried to demonstrate it to me couldn't get the Goal to Go to work himself. When I asked him detailed questions about the game, he disappeared very quickly.

Conclusions

The Big Surprise

As I said earlier, most industry observers expected laser games to be the highlight of AMOA. It turned out, in my opinion, that just the opposite was true:

- Of the five four-star games (see Ta-

ble 1), only one (Star Rider) is a laser game, and the laser feature is only incidental to its being a successful game.

- Of the seven three-star games, only three are laser games (all interactive lasers).

- The five games I liked the least (numbers 19 through 23 on Table 1) are all laser games.

Dave Ahl established the practice of giving (verbal) awards to participants at industry shows, in various categories. I'll continue this tradition.

The Coin-Op Industry's Biggest Myth

... that laser games will bail out the industry.

It is not laser disc, fellows, it is *playability*! Sure, lasers will help to the extent that they will make possible more convincing graphics. Lasers, particularly good interactive ones, (*not* Bega's Battle or Laser Gran Prix) can also help to make games more playable. But I urge the manufacturers to look upon laser discs as the means, not the end (as many apparently did at AMOA), to good games.

Best Game Introductions: Bally Midway

Bally introduced four fine games, one four-star game (Pac-Man Junior), two three-star games (Astron Belt and Discs of Tron), and a two-star game (Spy Hunter).

I hope Mssrs. Marofski and Janoski (president and marketing exec. of Bally) are now convinced that I have no hard feelings. (Bally filed a lawsuit to prevent me from publishing *Mastering Pac-Man*. Happily for me, and Pac-Man pattern-players, the lawsuit failed.)

Best Job of Snatching Defeat From the Jaws of Victory: Atari

This year Atari has been the industry coin-op leader, with about 65% of the total business. They had planned to introduce their first laser game, Firefox, at AMOA. There was a huge sign at the Atari booth heralding the advent of the game. There were also two Firefox cabinets, one regular size, and the other, absolutely huge.

Move up to Microsystems

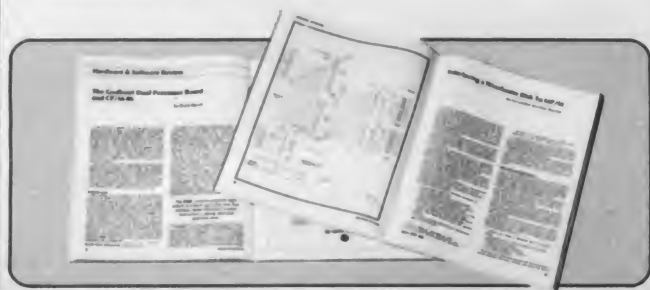
**THE JOURNAL FOR SOPHISTICATED
MICROCOMPUTER USERS.**

Microsystems is not, in any sense, for beginners. Unlike "personal computer" magazines, *Microsystems* is written *exclusively* for expert users and designers in the software and support hardware field.

If you need a reliable, high-level, up-to-date journal devoted to CP/M,[®] MP/M,[®] MS-DOS,[™] UNIX,[®] XENIX,[™] OASIS and other operating systems, then *Microsystems* is for you. We feature tutorials on the modification and special use of systems, offer short-cut routines, show you debugging procedures, techniques for interfacing, and much more. Our one purpose is to keep the advanced microcomputer professional at the leading edge of DOS development and use.

In a few recent issues of Microsystems you would have seen:

- Reviews of four C compilers: BDS C, Small C, tiny c TWO[™] and Whitesmiths C.
- A programming style comparison: Digital Research PL/I-80[™] vs. Microsoft BASIC.
- Twenty-seven 16-Bit DOS compared.
- Virtual segment procedures under UCSD Pascal.
- An in-depth look at MP/M-80 II.[™]
- A simple 6-byte hexadecimal ASCII conversion routine.
- Using CP/M's undocumented "Autoload" feature.
- An explanation of double density disk controllers.



- A comparison of five popular S-100 disk controller cards.
- OS-1—a UNIX-like DOS with a CP/M adapter.

Every issue of *Microsystems* keeps you at the forefront of the industry in customizing software and adapting hardware to meet new requirements and standards. You'll also find industry news, book and new product reviews, plus our regular *Software Directory* listing newly available programs.

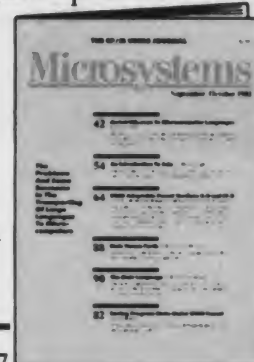
To get the high-level systems information you want, join the club of serious microcomputer professionals who subscribe to *Microsystems*. Use the coupon below to order, and save up to 31%!

PROFESSIONALS PLEASE NOTE:

Your subscription to *Microsystems* may be tax deductible. Check with your accountant.

Trademarks:

XENIX: Microsoft; tiny c TWO: tiny c assoc.;
PL/I-80, MS-DOS, MP/M-80 II: Digital Research.
Registered Trademarks:
CP/M, MP/M: Digital Research; UNIX: Bell Laboratories.



Microsystems CN 1987
Morristown, New Jersey 07960

YES, enter my subscription to *Microsystems* for:

- ☐ 12 issues at \$21.97—I save 19%.
- ☐ 24 issues at \$40.97—I save 24%.
- ☐ 36 issues at \$55.97—I save 31%.

Savings based on full 12-issue subscription price of \$26.97.

Mr. _____ 8H542
Ms. _____
(please print full name)

Company _____

Address _____

City _____

State _____ Zip _____

CHECK ONE: ☐ Payment enclosed. ☐ Bill me later.

Offer valid in U.S. and possessions only. Please allow 30 to 60 days for delivery of first issue. Satisfaction guaranteed or a prompt refund for unmailed issues.

NEW SUBSCRIBERS ONLY

Coin-Op Industry, continued...

Rumors were circulating that Clint Eastwood would make an appearance to promote Firefox (the game title is taken from the Eastwood movie of the same name; the theme of the game is based on Clint's exploits while stealing a top secret Russian jet).

Atari didn't make it. One Atari person told me that there were last minute "technical problems."

Atari did introduce two fine driving games, TX-1 and Pole Position II. But both could be considered merely extensions of Pole Position I, which we have all been playing for months. The only non-driving introduction made by Atari

The large version of Firefox, when introduced, is going to be a blaster.

was the fairly uninteresting Major Havoc.

I have a feeling, by the way, that the large version of Firefox, when introduced, is going to be a blaster. The cabinet has to be seen to be believed. The controls appear fully as sophisticated as those you would find on some real aircraft. The player's seat is even upholstered. The action will take place on a huge screen in front of the cabinet.

The big version of Firefox will cost the operators—get this—somewhere between \$13,000 and \$14,000. Yes, this does have repercussions for us players, as you will see when you read about the following award.

Worst News For Thrifty Players: Firefox

I am told on good authority that the large version of Atari's Firefox will have the industry's first dollar bill acceptor. Now, come on! Half a buck a game is bad enough. A dollar is outrageous!

Second Best Games: Williams

Williams, in my opinion, held a strong second place position at AMOA, behind Bally. They introduced two fine games, Blaster and Star Rider (I gave them both

four stars). Not only that, but Williams also introduced an interesting novelty game, called Rat Race.

Games That Need The Most Work: Stern

The two games from Stern placed 21st and 23rd, out of 23. Cliff Hanger, a me-too Dragon's Lair, might be made effective by the super-imposition of real-time computer graphics onto the laser background, thus preventing it from being solely a memory exercise. A change of this magnitude is probably not practical at this stage in the development of the game.

Goal to Go, which ran 23rd in a field of 23, might be salvageable if the action on the screen could be related to the player's actions on the control panel by blending in real-time computer action. For example, the player might control the path of the football during a pass, to reach receivers who have been programmed on the laser disc to run predetermined pass patterns. Here again, the company may consider such a modification to be totally impractical at this late stage in development.

I would respond that, if you the company has the funds, they would be well advised to invest a few million more to develop a possible winner, than to try to

market what is destined to be a sure loser.

Most Notable Non-Introduction

I have come to expect the unexpected from Nolan Bushnell, and he didn't disappoint. At his Sente booth, there was absolutely nothing to see, except a batch of cards that said, "Not to be opened until Dec. 9, on the outside."

Inside, was a detachable button that read,

"No Comment. SENTE"

Yes, there should be some even more exciting games at the next AMOA (or AOE or ASI, depending on the outcome of the Coin-op War). I predict that the *effective* blending of laser background and superimposed real-time foreground may be the news of the next show. We haven't seen this done effectively yet. Imagine, for example, the fabulous background of a M.A.C.H. 3, with the playability of a Blaster. Now there's a game we could all get hooked on.

On second thought, perhaps they shouldn't develop such a game. It would cost me, for one, over \$500 in quarters, to say nothing of the 1000 hours or so during which I could be doing something more constructive (like playing *River Raid* at home).



SPEND 5 MINUTES WITH OUR ACCOUNTANT AND YOU'LL FIRE YOURS



Introducing **TIME IS MONEY™**.
*A simpler, faster, more flexible
personal accounting software
package.*

While people have been overjoyed by the prospect of having their very own personal computer accountant, so far they've been underwhelmed by the products. Some are too complicated; others are little more than toys; still others are too slow and rigid in format.

Finally what you hoped for in a personal computer accounting package, **TIME IS MONEY** delivers.

IT'S SIMPLER.

TIME IS MONEY uses no codes and no special accounting terminology. Simple checkbook balancing with a full statement on-screen.

IT'S FASTER.

TIME IS MONEY runs with machine language speed so there's instant access to any transaction or balance. No complex or tedious setup prior to use.

IT'S MORE FLEXIBLE.

TIME IS MONEY defines, changes or deletes categories and accounts at any time. It grows as your needs grow.

IT'S MORE POWERFUL.

Tracks up to 240 separate assets and liabilities. 240 types of income from 240 different sources. 240 expense categories with tax deductions.

And all you need is an Apple II, II + , IIe, or compatible computer.

Find out why **TIME IS MONEY** is the best personal accounting software package on the market. Call or write for a data sheet today. Even better, visit your dealer and try it out for yourself.

If you have a spare 5 minutes.

TURNINGPOINT™
SOFTWARE

11A Main Street, Watertown, MA 02172 (617) 923-4441

© Copyright 1983 Turning Point Software, Incorporated
Apple is the registered trademark of Apple Computer, Inc.

CIRCLE 241 ON READER SERVICE CARD

LycO Computer Marketing & Consultants

TO ORDER

CALL US

TOLL FREE 800-233-8760

In PA 1-717-327-1824

PERCOM

FOR ATARI COMPUTERS

AT88S1	....\$299.00
AT88S2	....\$535.00
AT**S1PD	....\$439.00
RFD40S1	....\$399.00
RFD40S2	....\$675.00
RFD44S1	....\$449.00
AT88 doubler	

HARD DISK DRIVES for APPLE IBM-PC

5MEG	....\$1349.00
10MEG	....\$1599.00
15MEG	....\$1999.00
20MEG	....\$2359.00

Add \$10.00 for TRS-80 Drives

TEXAS INSTRUMENT

Disk Drive...\$245.00

TRAK DISK DRIVES

AT-D1	.....\$379.00
AT-D2	.....\$399.00
PRINTER CABLE	.....\$22.95
Software for ATD-2	.....\$22.95

RANA DISK DRIVE

COMPUTER CARE

BIB	
5 1/4 DISK DRIVE	
CLEANER	.....\$12.75
COMPUTER CARE	
KIT	.....\$19.75

BLANK DISKETTES ELEPHANT

Single Side SD (10)	.....\$17.75
Single Side DD (10)	.....\$21.75
Double Side DD (10)	.....\$26.75

MAXELL

MD I (10)	.....\$28.75
MD II (10)	.....\$38.75

CERTRON CASSETTES

CC-10 12 for	.....\$15.99
CC-20 12 for	.....\$17.99

INNOVATIVE CONCEPTS

Disk Storage (holds 10)	....\$4.95
Disk Storage (holds 15)	....\$9.95
Disk Storage (holds 50)	....\$26.95



SSI	
Battle of Shilo	....\$26.75
Tigers in the Snow	....\$26.75
Cosmic Balance	....\$26.75
Knights of the Desert	....\$26.75
Battle for Normandy	....\$26.75
Germany 1985	....\$36.75

RANA DISK DRIVES

Elite 1	.....\$295.00
Elite 2	.....\$449.00
Elite 3	.....\$559.00

MICRO-SCI

A2	.....call
A40	.....call
A70	.....call

MUSE

Castle Wolfenstein	....\$20.75
Caverns of Frietag	....\$20.75
Robot War	....\$26.75

CONTINENTAL

Home Accountant	.....\$51.75
Book of Apple Software	.....\$16.75
BRODERBUND	
Bank Street Writer	....\$49.75
AE	.....\$24.75
LODE RUNNER D	....\$24.75
Choplifter	....\$24.75
David's Midnight	....\$24.75
SPINNAKER	
Kindercomp	....\$21.75
Story Machine	....\$23.75
Face Maker	....\$23.75
Snooper Trooper	....\$29.75
Delta Drawing	....\$34.75

EPYX

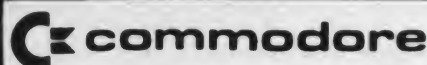
Temple of Apshal	....\$26.95
Star Warrior	....\$26.95
Crush, Crumble & Chomp	....\$22.75

ADVENTURE

Saga#1 Adventureland	....\$29.95
Saga#2 Pirate Adventure	....\$29.95
Saga#3 Secret Mission	....\$29.95
Stone of Sisyphus	....\$24.95

ALIEN GROUP

Atari Voice Box	....\$99.00
Apple Voice Box	....\$129.00



1212 Programmers Ad	....\$44.75
1213 Vicmon	....\$44.75
Vic 20 dust cover	....\$6.99
Vic 64 dust cover	....\$6.99

TIMWORKS

INVENTORY	.....\$59.75
ACCOUNTS REC	.....\$59.75
ACCOUNTS PAY	.....\$59.75
GENERAL LEDGER	.....\$59.75
PAYROLL	.....\$59.75
CASH FLOW	.....\$59.75
SALES ANALYSIS	.....\$59.75
ELEC. CHECKBOOK	.....\$59.75
MONEY MANAGER	.....\$59.75
DATA MANAGER	.....\$59.75
WALL STREET	.....\$59.75

HES 64

Sound Box	.....\$9.95
64Forth	.....\$55.75
Hesmon	.....\$25.75
Turtle Graphics	.....\$37.75
Heswriter	.....\$28.75
Gridrunner	.....\$19.75
Attack of M C	.....\$22.75
Turtle Trainer	.....\$22.75
Turtle Tutor	.....\$22.75
Paint Brush	.....\$22.75
Benji	.....\$25.75
Home Manager	.....\$28.75
Time Money Mgr	.....\$44.97
OmniCalc	.....\$33.75
Sword Point	.....\$19.95
Hes Modem	.....\$52.75

CARDCO

Cardprinter / LQ1	.....\$499.00
Cardprint DM1	.....\$109.00
5 Slot Expansion 64	.....\$54.00
64 Write NOW	.....\$39.00
64 Mail NOW	.....\$29.00
2 Write NOW	.....\$29.00
64 Keypad	.....\$29.00
Universal Cass. Int	.....\$29.75
Printer Utility	.....\$19.75
6 Slot Expansion	.....\$79.95
3 Slot Expansion	.....\$24.95
PRINTER INTERFACE	.....\$39.75
PRINTER INTERFACE with full graphics	.....\$65.75
LIGHT PEN	.....\$29.75

PARKER 20	
Frogger (ROM)	....\$33.75
QBert (ROM)	....\$33.75
Tutankham (rom)	....\$33.75

SPINNAKER 64

Kindercomp	....\$21.75
Story Machine	....\$23.75
Face Maker	....\$23.75
Snooper Trooper	....\$29.75
Delta Drawing	....\$34.75
Shamus II c/d	....\$24.95
Pinhead c/d	....\$22.95

QUICK BROWN FOX

QBF Word Processor	....\$49.95
LJK	

Letter Perfect	....\$105.00
Data Perfect	....\$95.00

ADVENTURE INTERNATIONAL	
S. Adams Adventure	....\$28.75

VIC-64

Household Finance C/D\$24.75
-----------------------	-------------

VIC 20

King Arthurs Heir Cass	....\$24.75
Monster Maze Rom	....\$24.75



SYNAPSE

BLUE MAX C/D	....\$24.75
FI. APOCALYPSE C/D	....\$24.75
PHAROAH'S CURSE C/D	....\$24.75

FIRST STAR

ASTRO CHASE C/D	....\$22.75
BRISTOLS C/D	....\$22.75
FLIP FLOP C/D	....\$22.75

ALIEN GROUP

Voice Box 2	....\$99.75
DON'T ASK	
Sam	....\$41.75
Abuse	....\$15.95
Teleatri	....\$27.95
Poker Sam	....\$24.95

APX

3R Math	....\$19.95
Typo Attack	....\$24.95
Family Budget	....\$19.95
F. Cash Flow	....\$19.95

BRODERBUND

Bank Street Writer D	....\$49.75
AE D	....\$24.75
Apple Panic D	....\$23.75
Choplifter ROM	....\$32.75
David's Midnight	....\$24.75
Stellar Shuttle C/D	....\$18.75
Ft. Apocalypse	....\$24.75

EPYX

GATEWAY TO	
ASPHI R	....\$28.75
JUMPMAN JR R	....\$28.75
PIT STOP R	....\$28.75
GATEWAY TO	

SSI

Battle of Shilo C/D	....\$26.75
Tigers in the Snow C/D	....\$26.75
Battle for Normandy C/D	....\$26.75
Knights of the Desert C/D	....\$26.75
Cosmic Balance C/D	....\$26.75

ON-LINE

Frogger	....\$24.95
Wizard & Prin	....\$26.95

ROKLAN

Wizard of War	....\$29.75
Gorf	....\$29.75
Delux Invader	....\$27.95

BIG 5

Miner 2049\$32.75
------------	-------------

EASTERN HOUSE

Monkey Wrench 2\$52.75
-----------------	-------------

BRODERBUND

LODE RUNNER D	....\$24.75
OPERATION	
WIRLWIND D	....\$29.75
DROL D	....\$24.75

PARKER BROTHERS

Tutankham R	....\$33.75
Super Cobra R	....\$33.75
Astro Chase R	....\$33.75
Frogger R	....\$33.75
QBert R	....\$33.75
Popeye R	....\$33.75
Risk R	....\$42.75
Chess R	....\$42.75

SPINNAKER

Story Machine R	....\$26.75
Face Maker R	....\$24.75
Kinderomp R	....\$20.75
Fraction Fever R	....\$24.75
Delta Drawing R	....\$26.75

600XL ...\$CALL
800XL.....for
1400XL...Lowest
1450Prices

1020 PRINTER	.....NOW
1025 PRINTER	.....IN
1027 PRINTER	.....STOCK
1050 DISK DRIVE	.....\$SAVES
1010 RECORDER	....\$74.75

Lyc0 Computer Marketing & Consultants

TO ORDER
CALL US

TOLL FREE 800-233-8760
In PA 1 717-327-1824

PRINTER INTERFACING

PRINTER PAPER AVAILABLE

SAVE on these in-stock PRINTERS

Available for IBM PC, Apple, Atari, Vic 20 & Vic 64

EPSON

OKIDATA

CITOH

LETTER QUALITY

SMITH CORONA TP2...\$449.00

DIABLO 630 ..\$1719.00

ALPHACOM 42\$89.00
ALPHACOM 81\$129.00
NEC 8023\$369.00
NEC 8025\$699.00
NEC PC-8200
COMPUTER\$CALL

RX-80\$SAVES
RX-80FTON
FX-80In-Stock
FX-100EPSON
MX-80FTPRINTERS
MX-100\$SCALL\$

MANNESMANN TALLY

SPIRIT 80\$CALL
MT 160L\$CALL

80\$SAVES
82ACALL for
83ALOWEST
84PRICES
92on these
93In-Stock
PACEMARK 2350...PRINTERS

ATARI 850 REPLACEMENTS IN-STOCK

GORILLA GX100\$179.00
PROWRITER 8510\$339.00
PROWRITER II\$659.00
8600\$1025.00
STARWRITER\$1099.00
PRINTMASTER\$1499.00

STAR MICRONICS

GEMINI 10X\$269.00
GEMINI 15X\$CALL
DELTA 10\$479.00

MODEMS

ANCHOR MARK I ..\$79.00
ANCHOR MARK II ..\$79.00
HAYES SMART ..\$239.00
HAYES MICRO II ..\$309.00
Micro Bit
MPP-1000.....\$129.75
NOVATION
CAT\$144.00
D-CAT\$155.00
J-CAT\$115.00
APPLE CAT II\$279.00
212 APPLE CAT ..\$589.00

CORDLESS TELEPHONES from ...\$69.75

MONITORS

Sakata Color\$229.00
Amdek Color I\$275.00
Amdek 300 Green\$149.00
Amdek 300 Amber\$149.00
Gorilla Green\$99.00

DUST COVERS

800\$3.99
400\$3.99
1200\$3.99
410\$3.99
810\$3.99
1050\$5.99
PROWRITER\$5.99
GEMINI 10X\$5.99
PERCOM DISK\$5.99
VIC 20/64\$5.99



APPLE DUMPLING GX\$99.75
APPLE DUMPLING 64 (16 Buffer) \$179.75

INFOCOM

Zork I, II, or III\$26.75
Deadline\$33.75

HES 20

HES MON Rom. \$25.75
Turtle Graphics. \$25.75

HES Writer... \$25.75
Shamus..... \$25.75
Protector..... \$25.75

VIC 64/20

PACMAN\$33.75
DONKEY KONG.....\$33.75
DIG DUG\$33.75
DEFENDER\$33.75
CENTIPEDE\$33.75

FIRST STAR 64

BRISTOLS C/D.....\$22.75
FLIP FLOP C/D\$22.75

SYNAPSE 64

ZEPPELIN C/D\$24.75
BLUE MAX C/D\$24.75
DIMENSION X C/D\$24.75

EPYX 64

ASPHI R.....\$28.75
JUMPMAN JR R\$28.75
PIT STOP R\$28.75

commodore

BRODERBUND 64

BANK STREET
WRITER.....\$49.75
CHOPLIFTER\$24.75
LODE RUNNER\$24.75
DROL\$24.75

KOALA TOUCH TABLET...\$69.75

PERCOM

AT88S1 ..\$299.00
RDF44SI \$449.00

GEMINI 10\$269.00

IBM

PACMAN\$27.95
DONKEY KONG.....\$27.95
DIG DUG\$27.95
DEFENDER\$27.95
CENTIPEDE\$27.95

KOALA TOUCH TABLET...\$99.75

DEADLINE\$34.75
ENCHANTER\$34.75
INFIDEL\$34.75
PLANETFALL\$34.75
STAR CROSS\$34.75
SUSPENDED\$34.75
WITNESS\$34.75
ZORK I\$34.75
ZORK II\$34.75
ZORK III\$34.75

ATARI

.....\$29.75
.....\$29.75
.....\$29.75
.....\$29.75
.....\$29.75

KOALA TOUCH TABLET...\$69.75

.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75

APPLE

PACMAN\$27.95
DONKEY KONG.....\$27.95
DIG DUG\$27.95
DEFENDER\$27.95
CENTIPEDE\$27.95

KOALA TOUCH TABLET...\$84.75

.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75
.....\$34.75

48K RAM\$75.00
64K RAM\$99.00

ATARI WRITER\$79.00

BUSINESS

Visicalc\$159.75
Letter Perfect.....\$89.75
Letter Perfect.....\$89.75
Data Perfect.....\$89.75

TEXT WIZZARD.....\$34.75
SPELL WIZZARD\$34.75
File Manager.....\$69.75
Home File Mgr.....\$69.75
Bookkeeper.....\$119.75
C.R.I.S.....\$199.75



TO ORDER



CALL TOLL FREE

800-233-8760

Customer Service 1-717-327-1825 Jersey Shore, PA 1774C

or send order to
Lyc0 Computer
P O Box 5088

POLICY

In-stock items shipped within 24 hours of order. Personal checks require four weeks clearance before shipping. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. PA residents add sales tax. All products subject to availability and price change. Advertised prices show 4% discount offered for cash, add 4% for MasterCard or Visa. DEALER INQUIRIES INVITED.

CIRCLE 137 ON READER SERVICE CARD

The CBasic Clinic

Session Four

John A. Libertine

In our last session, you were introduced to one of the most powerful attributes of CBasic, its file handling procedures. The programs were, of course, very elementary; but they contain many of the elements needed for the most complex applications.

Before we start on new material, let's go back and fill in a few holes. It would be helpful if you had a printout of the two programs from Part 3. We might start by breaking files down into their parts. I will use an analogy which is far from original but does get the idea across. Think of the entire *File* as a file cabinet with several drawers. Each drawer represents a *Record*. For example, if the whole cabinet consisted of customer records, we could call the file Customer.fil. Each drawer (record) might be for a single customer. Now, look in one drawer. It will be filled with file folders. Each folder would be a *Field*. If you can remember this simple analogy, you should be able to understand the jargon. A file contains one or many records. Each record contains one or many fields. Simple, isn't it?

Here is a more specific breakdown. Let's go along with calling the file Customer.fil. Note that it follows the CP/M convention for a file name: up to eight characters followed by an optional extension name of up to three characters. If the extension is used, the period is mandatory.

Okay, our file name is Customer.fil. It will contain several records, each a specific customer. Records do not have names. Think of a record as a full line on your screen containing several different variables. For example:

VARIABLES,VARIABLE%,VARIABLE

is a single record containing three variables (each called a field). The first is a string, the second an integer, and the third a real number variable. The length of a record can be as short as one variable or as long as necessary. The commas in the line above act as separators (*delimiters* is the computer term) between each field. The *end of a record* is indicated by a carriage return plus a linefeed. In other words, the end of a line.

The fields within each record are individual variables each of which can consist of up to 31 characters. For example, a couple of fields might be: Customer.address.one\$ or ABC.Mfg.Co.Address\$. Note that in these cases, we are using a string variable (the \$ at the end indicates that). Some fields might be integer or number variables like Part.Number% or Total.sales.

Or we might show this more graphically as in Table 1.

File	Records	Fields
CUSTOMER.FIL	Record #1	COMPANY.NAMES NAME.AND.ADDRESS\$ CITY.ST.ZIP\$
	Record #2	COMPANY.NAMES NAME.AND.ADDRESS\$ CITY.ST.ZIP\$
	and so forth. . .	

Table 1.

You may think we have spent a great deal of time on what appears to be a simple, basic fact; but the truth is that this nomenclature is used over and over in most of the literature and documentation you will read. It is important to understand the concept.

Variables In A File

Now, a word about variables in a file. Look back at the two programs we used in Part 3. You will see that in both programs we used the variables ADD1\$, ADD2\$, and ADD3\$ for three address lines (three fields). The files do *not* store the variable names. They simply store a string, an integer, or a real number in the order you designate. This means that you do not have to use the same variable *name* to access the fields.

For example, you could re-write the PRINTER.BAS program and change the above three variables to ADDRESS1\$ or LINE1\$ or whatever. It is only important that you have the same *type* of variable (string, integer, or real) and that you have the same *number* of variables in each record. In the case of the PRINTER.BAS program, you must read out four string fields followed by three real number fields. Specifically, you could change the line numbered 20 to read:

```
20 READ #1; LINE1$,LINE2$,LINE3$,LINE4$,  
    NUM1,NUM2,NUM3
```

Of course, if you do this, you also have to use the same variable names for printing out the field. For example, in the line following line 20, you would have to change PRINT NAMES to read PRINT LINE1\$. Furthermore, it is not necessary to have two separate programs to use this convention. Once a file has been written to and then closed, you can re-open it and read it with entirely different variable names.

Why go through this rigamarole? One reason might be documentation. You write the file opening routine with long variable names which make the program easier to understand and simpler to debug. Later, when you want to print it out, you could use simple, short variables to save time and space. Or as in the case of our last session, you might use one program to access the files written with another. It might make more sense to use different variables for clarity. In any case, you should

ATARI and TERMINAL USERS:

LOOK CLOSELY AT OUR \$499⁹⁵ CP/M COMPUTER



The ATR8000 is an amazingly versatile CP/M computer that uses either an RS-232 terminal or an ATARI home computer for the display device. The ATR8000 has these features:

- 64k RAM
- Z80A processor, 4 MHz
- RS-232 port with software to run a serial printer or a modem.
- Parallel PRINTER port.
- Runs up to four 5¼" and 8" drives that are any mixture of size, type (single and double-sided) and density.
- Includes double density CP/M 2.2.

The ATR8000 can read and write CP/M disks from other computers. Some of these are: Kaypro • Osborne • Xerox • Cromemco • TRS-80 I • H89 • NEC PC100A • Z100 and more!

ATR8000's CP/M display is 80 columns wide with a moveable 40 column window. All 80 columns are displayed at once on a B&W TV or a monitor with AUTOTERM80, \$29.95.

From the designers of CO-POWER-88

SWP
Inc
MICROCOMPUTER PRODUCTS

2500 E. Randol Mill Road — 125
Arlington, Texas 76011
(817) 861-0421 (metro) 469-1181

Prices and specifications subject to change without notice. Trademarks: ATARI: ATARI, Inc. CP/M: Digital Research, Inc. Z80: Zilog ATR8000: SWP, Inc.

Please rush me free literature on the ATR8000 for
☐ ATARI ☐ a terminal.

Send to: SWP Microcomputer Products, Inc.
2500 E. Randol Mill Rd., #125
Arlington, TX 76011

#400 #410

name

street

city

state

zip

MAIL TODAY!

CBasic Clinic, continued...

now understand that CBasic writes *types of variables* to a file rather than the exact variable names you give it.

We learned last session that the type of files we have used so far are *sequential* or *stream* files. This means you can read a file only in the exact order in which it was written. Next session, we will go into *random access* files, which allow you to go directly to any given record in the file. However, almost everything we have discussed about sequential files will be applicable to random access files as well.

Again, look at the BOWLING.BAS program. You will recall we created the file with the FILE statement. This opens an existing file or creates one if it does not exist. The other way to create a file is with (oddly enough) the CREATE statement.

Remember, if you use CREATE, it unquestioningly creates a new file even if an old one exists with the same name. It erases the old file. The correct way to open an existing file is either with FILE or, more commonly, with the OPEN statement. The second program from Part 3 (PRINTER.BAS) uses this method just above line 20.

There is one more difference between FILE and CREATE that you must watch for. You can create a new file with CREATE using either the literal file name (enclosed in quotes) or a variable:

```
CREATE "FILENAME.EXT" AS 1
```

or

```
CREATE FILE$ AS 1
```

Assuming you have previously defined FILE\$ as a file name, either of these will work fine. Not so with the FILE statement.

CBasic writes types of variables to a file rather than the exact variable names you give it.

This *must* use a variable only as: FILE FILE\$. Notice that AS 1 is not needed when you use the FILE statement. The lowest unused file number (between 1 and 20) is automatically assigned to the file.

If you think this is so obvious that I am belaboring a point, take a look at the bottom of page 129 in the *CBasic User Guide*. Even the experts can goof. They show an example of the FILE statement which uses a literal file name instead of a variable. If you copied this example, you would get a compiler error. File handling is a little tricky. Learn the rules right—the first time. It will save you untold headaches in the future.

If you wrote several different records to our BOWLING.FIL last session, you may have noticed an odd printout of the Three String Average. Unless by chance the average was a whole number, you might have gotten an average like: 189.73542973. This is an awkward percentage at best.

Wouldn't it be nice if you could specify that you want the percentage rounded off to the second decimal place? There is just such a way to control the printout so you can specify exactly how your numbers will be rounded off. You can also use the same method to make your output come out in dollars and cents formats. This can be done with the PRINT USING statement.

PRINT

Let's take a look at a regular PRINT statement and then a PRINT USING statement:

```
PRINT "The average is: "; AVERAGE
```

```
PRINT "The average is: ";
```

```
PRINT USING "###.##"; AVERAGE
```

(Note the semicolon at the end of the first line above. It will cause the next program line to print out on the same line.)

Another variation would be:

```
PRINT USING "The average is: ###.##"; AVERAGE
```

The final variation we will discuss would be:

```
PRINT USING FORMATS; AVERAGE
```

In this last example FORMATS will have been previously defined as: LET FORMATS = "The average is: ###.##"

If you use *WordStar*, you have already seen how a # character can be used to represent a number (in the case of *WordStar*, a page number). The same basic idea is used in CBasic but on a much more sophisticated and expanded level. The ###.## in our example above is a *map* or *matrix* or *format* which the computer will fill in with actual numbers. In this case, we are saying to the computer: Print out a three-digit number then a period, then round off to two decimal places. Be assured this is a true round off, not a truncation. For example, 123.3345 will round off to 123.33, and 123.33567 will round off to 123.34.

Even if the number has fewer than three digits, there is no problem. The computer will print out a space in place of the first (or second) digit. If the number turns out to be a fractional decimal, it will print a leading zero then a period then two places. Examples: 123.456789 will printout as 123.46; 12.3 will printout as 12.30, and .345678 will printout as 0.35.

PRINT USING

The PRINT USING statement has many variations including use with strings. For now, we will just stick with the simpler numeric forms. You have already seen how to use it with regular numbers to round off decimal places. Now we are going to use it to produce dollars and cents formatted output. Look at this line:

```
PRINT "Total sales for the quarter were: ";
PRINT USING "$####,###.##"; TOTAL.SALES
```

or

```
PRINT "Total sales for the quarter were: ";
PRINT USING FORMATS; TOTAL.SALES
```

(Assuming FORMATS = "\$####,###.##")

This is very similar to our first example. Here we say the largest figure expected is 999,999.99. But notice the two dollar signs at the beginning of the format string? This is a convention which says: *Float* a single dollar sign just to the left of the first printed digit. Thus the dollar sign will print correctly for \$999,999.99 as well as for \$1,234.56 or \$12.00.

The commas indicate you want comma formatting. Actually, you can put the correct number of commas (in this case two) anywhere in the format string ("\$\$,#####.##" or "\$\$#####.##") and they will automatically be positioned, but that leads only to confusion, and most good programmers place the commas in the position in which they are to print.

Study the sections on PRINT USING in your documentation or in *CBasic User Guide* for more details, but this will give you a fairly good start.

There is one further advantage to PRINT USING. The printouts can be automatically aligned on the decimal point. CBasic does this by adding spaces at the left of each formatted printout. If we represent a space with the lowercase s, you can see the actual printout in the left column and the way your computer sees it in the right:

\$ 123,456.78	\$ 123,456.78
\$ 1,234.56	sss\$1,234.56
\$ 12.34	sssss\$12.34
= \$####,###.##	= \$####,###.##

There is a slight catch to aligning on decimal points. The key is to be sure the first printed character *or space* starts in the same column position for each line. If the numbers are the very first thing to print in a line, it is easy because each number starts at column 1 (or 0 on some machines). Most times, how-



Educational News

Orange Plus Educational News located at 23801 Calabasas Road / Suite 2050 / Calabasas, CA 91302 / (213) 999-5210

Legal Apple[™] Compatible

New Computer runs CP/M & Apple[™] Software



CALABASAS - Now instructors can teach Apple-type programs such as LOGO in one class and professional-style word processing in another without any hardware changes. Dual microprocessors (Z80-A & 6502, two computers in one case), with the radical new Orange Plus development, the "EuroROM", allows the machine to read/write/work with Apple-type software as well as CP/M programs and access either CPU via the keyboard.

The "ORANGE+TWO"[™] is a brand new direction in the evolution of the personal computer. ORANGEFORTH-83, a derivative of Fig-FORTH — a readily available public domain language, is resident in ROM*. Also included is CP/M 3.0, Digital Research's latest CP/M version. There is also a built-in disk drive controller for two Apple-type drives, a cassette interface, joystick port, color graphics and ASCII keyboard with numeric keypad. For expert word processing, the keyboard features upper and lower case (lower case characters are true descenders) with auto repeat.

This new breed of computer is a break-through for educators and school systems throughout the world. The ability to run both Apple-type and CP/M software on the same machine relieves financially-pressed educators from expensive equipment burdens, allowing them to spend more money where it counts... **on the teachers.**

*Available on disk at extra cost.

Orange Plus Koala Pad

With the touch of your finger, the Orange Plus Koala Pad (Touch Tablet with Micro Illustrator) takes control of your computer to create beautiful, high-resolution computer graphics. Finally, a full-featured graphics tablet at an affordable price.

Collins International Trading Corporation

23801 Calabasas Road, Suite 2050 / Calabasas, CA 91302

(213) 999-5210

CIRCLE 105 ON READER SERVICE CARD

MORE FOR LESS

The "ORANGE+TWO"[™] 64K computer includes these standard features:

Built-in CP/M 2.2 n/c
Digital Research's CP/M 3.0 n/c
Built-in disk drive controller card for two Apple-type drives n/c
Numeric keypad with separate return key n/c
110/220 volt switch selectable power supply, 50-60 Hz n/c
Full function ASCII keyboard with auto repeat n/c
Cassette Interface n/c
Grounded metal base plate n/c
Adjustable audio volume n/c
ORANGEFORTH-83, Z80-A FORTH language, resident in ROM n/c
Z80-A CPU, a 2nd computer n/c
6 slot two-sided logic board n/c
Bank switchable RAM, fully socketed, expands to 256K n/c
Programmable 2764 EPROMS ... n/c

TOTAL

"ORANGE+TWO"[™] \$1295.00
Compare the features included in the "ORANGE+TWO"[™] with the competition's and you will find that most competitors are priced over \$2,000.

MORE PRODUCTS FROM ORANGE+ COMPUTER SYSTEMS

Disk-based ORANGEFORTH-83 language with full documentation
\$99.95

Digital Research's[™] CBasic with disk and documentation
\$49.95

Orange Plus KoalaPad[™] Touch Tablet w/Micro Illustrator[™]
\$124.95

Orange Plus Joystick (works on "ORANGE+TWO", Apple II, II+ & IIe)
\$29.95

Orange Plus Self-Centering Joystick
\$39.95

10MB (Formatted) 5 1/4" half-height Winchester Hard Disk Drive
\$1495.00

Controller & Interface for Hard Disk**
\$395.00

**Includes everything necessary to be installed in "ORANGE+TWO", Apple or Franklin Computer

The above are suggested retail prices. Prices may vary from state to state.

CBasic Clinic, continued...

ever, that will not be the case. We need a way to line up wherever you want to start on a line. Enter the TAB function.

TAB

The structure of a TAB function is quite simple: TAB (number or variable). For example: TAB(23) or TAB(N%). Here 23 or N% means column 23 or column N%. It works very much the way the tab key on your typewriter works and will tab on either your screen or printer (whichever is active for printout).

Do watch for one problem. If you already have something printed out on a line, the tab position must be beyond this point or you will get a carriage return plus a linefeed, and your printout will be on the next line. Example: If you print out a string which ends at column 50, the tab must go to at least column 51. If in this case you tab to column 25, it will print at column 25 of the next line down.

Following are some typical examples of the use of the TAB function:

```
PRINT TAB(35); "• The asterisk marks  
                column 35"  
PRINT "The average for 3 strings is:"  
      ;TAB(40);  
PRINT USING "###.###"; AVERAGE.STRING  
PRINT TAB(10); NUMBER1%; TAB(20); NUMBER2%;  
      TAB(30); NUMBER3%
```

LPRINTER

Before we go into this month's program, let me ask if you have done your homework. Did you look into the LPRINTER and CONSOLE statements? Bottom line: When you start a CBasic program, it assumes (defaults) the CONSOLE statement is active. All printouts appear on your screen. If you then type LPRINTER (it must be the *only* statement on a line, except a

REM can follow it), everything from then on will print on your printer instead. To stop printer output and go back to the screen, type CONSOLE (again as the only statement on the line) and back you go to screen printout. This back and forth switching is called a *toggle*—on and off. There is one important exception to all this. An INPUT statement will *always* print out on the screen, even if LPRINTER is active.

Well, we have reached the end of another session. Now you have your work cut out for you. Take a look at the program listing for this month. See if it makes logical sense from just reading it. Most of the material we have discussed in this session is included, so you can actually see it in action. Type it out on your word processor, store it (call it SESSION4.BAS), compile it (CBAS2 SESSION4), correct errors and recompile if necessary, and run it (CRUN2 SESSION4). Be sure your printer is ready, since most printouts are directed to it.

Incidentally, the programs we have used in previous sessions were very short, and I am assuming that you have enough disk space to hold a word processing or text editing program plus the CBasic programs (CBAS2.COM and CRUN2.COM) plus the .BAS program plus the .INT program. Until now, these last two shouldn't have occupied more than 2K to 4K. However, when you get into longer programs, you will want to put them on another disk. Depending upon your computer and its disk configuration, this listing will occupy from 5K to 9K for the .BAS program plus 3K or 4K for the .INT.

To use a second disk, just add the disk prefix (usually B:) when you create the program (B:SESSION4.BAS). Then do the same when you compile and run the program (i.e., CBAS2 B:SESSION4 or CRUN2 B:SESSION4). This also applies to any *files* you may include within a program. For example, in this month's program, you would change the file name to B:EXAMPLES.FIL.

END

PICK PROOF

"Clearly an Excellent Performer."
—Rus Adams, INFOWORLD

Locksmith™ can't pick it. Nibbles Away™ can't sink its teeth into it.
Back-it-up™ doesn't. And Clone™ won't.

The DISK ENCRYPTION SYSTEM stands firm against every kind of copy theft, memory theft or dump. Interchangeable program elements and variable parameters (including DOS-Ram protect) allow you to customize literally millions of protection systems for

every program you write. FASTLOAD feature allows you to load protected disks at 5000 bytes per second...FAST. Total program security for any Apple® (or Apple® compatible) with 48K Ram, DOS 3-3.

ONLY \$60, plus \$2 shipping and handling.

THE DISK ENCRYPTION SYSTEM
ONLY FROM:

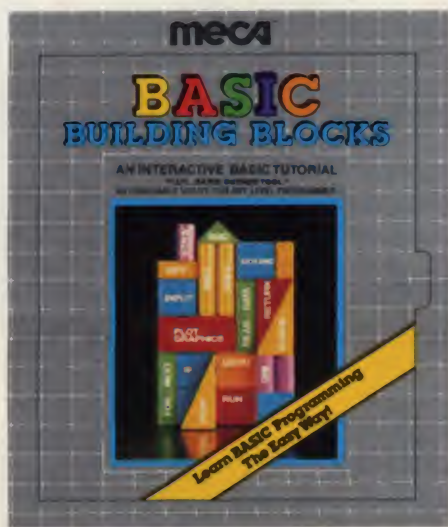
WINNER'S CIRCLE

2420 Parker St., Berkeley, CA 94704
(415) 845-4813

Apple® is a registered trademark
of Apple Computers, Inc.

"How MECA experts taught us more Basic in one hour than we learned in 12 hours from a book."

"BASIC BUILDING BLOCKS™ lets us interact with our computer and learn at our own pace. Dad says it's so easy to use, it even eliminates the need for him to read the manual. You should see all the programs Mom has written by herself. I like it because it really gets into the fun of the computer...fast. BASIC BUILDING BLOCKS is like having personal computer experts in our house."



- A unique, challenging and entertaining introduction to BASIC programming
- Consumer testing shows that 9 out of 10 people didn't even need the manual.
- BASIC commands fully demonstrated, including disk access, sound and graphics.
- Over 60 sample programs executing so you can see how BASIC commands work, learn program structure and flow of control
- Innovative program design for freedom of movement anywhere in the tutorial. This lets you test sample programs at your own pace until you understand how they work.
- Actually encourages you to write and test your own programs.
- Design useful programs, trace their flow and detect programming errors



My
Dad

My
Mom

Me

Designed for IBM, Atari and Apple Personal Computers. Available where fine software is sold.

meCA™ Software that makes your home computer worth having.™

©1984 • MICRO EDUCATION CORPORATION OF AMERICA • 285 RIVERSIDE AVE. • WESTPORT, CT • 06880 • (203) 222-1000

CIRCLE 140 ON READER SERVICE CARD

JUMPMAN'S A GREAT GAME. BUT YOU'VE GOT TO WATCH YOUR STEP.



Meet the Alienators. A fiendish bunch who've planted bombs throughout your Jupiter Command Headquarters.

Your job? Use your lightning speed to scale ladders, scurry across girders, climb ropes and race

through 30 levels to defuse the bombs before they go off.

That's the kind of hot, non-stop action we've packed into the award-winning,* best-selling Jumpman™, and into Jumpman Jr., our new cartridge version with 12 all-new, different and exciting screens.

Both games force you to make tough choices.

Should you avoid that Alienator, climb to the top

and try to work your way down, or try to hurdle him and defuse the bombs closest to you before they go off?

If you move fast you'll earn extra lives.

But if you're not careful, it's a long way down.

So jump to it. And find out why Jumpman and Jumpman Jr. are on a level all their own.

One to four players; 8 speeds; joystick control. Jumpman has 30 screens. Jumpman Jr. has 12 screens.



EPYX
COMPUTER SOFTWARE

STRATEGY GAMES FOR THE ACTION-GAME PLAYER.

*1983 C.E.S. award winner.

CIRCLE 124 ON READER SERVICE CARD



CBasic Clinic, continued...

Listing 1.

"SESSION4.BAS" LISTING, Page 1

LISTING OF "SESSION4.BAS" PROGRAM

```

REM          Note that in this program the input and
REM          output routines have been intermixed and
REM          even placed out of order. This is not good
REM          programming. It is done to illustrate the
REM          versatility of CBASIC and the methods by
REM          which you can go from one module to another
REM          (with GOSUBS, GOTOS, etc.)
REM          Try to follow the logic of the program even
REM          though it "jumps" back and forth.

REM          Since you have a printed listing of this program,
REM          it is not necessary that you enter all the "REM"
REM          statements. Especially the long ones like this
REM          one and the one above!

GOSUB 10000 REM Clear screen
PRINT "      THIS IS A SAMPLE PROGRAM TO ILLUSTRATE THE "
PRINT
PRINT "      USE OF FILES AND FORMATTED PRINTING IN THE"
PRINT
PRINT "      CBASIC LANGUAGE"
PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
INPUT "HIT <RETURN> OR <ENTER> TO START PROGRAM";LINE DUMMYS

GOSUB 10000 REM Clear screen
File$ = "Examples.fil" REM Assign variables
Format1$ = "####.###"
Format2$ = "$$###,###,###.###"
Format3$ = "The answer is: $$###,###,###.###"
FILE FILE$ REM Create file with "FILE" statement
IF END #1 THEN 10 REM If new file, goto input routine.
REM If existing file go to next line
REM to start printout

100 READ #1; F$,L$,B,Y,S,N1,N2,N3 REM Note that file is being read out
REM          with DIFFERENT variables than
REM          were entered. However, the types
REM          of variables (2 strings followed by
REM          6 real numbers) is the same.
PRINT "      FILE HAS BEEN READ INTO MEMORY."
PRINT
PRINT "      IF YOU ARE READY TO PRINTOUT, BE SURE YOU"
PRINT
PRINT "      HAVE PAPER IN PRINTER (ROLL OR CONTINUOUS FORM)"
PRINT
PRINT "      AND PRINTER IS READY"
PRINT:PRINT:PRINT:PRINT
INPUT "HIT <RETURN> OR <ENTER> TO PRINTOUT";LINE DUMMYS
GOTO 20 REM Goto printout routine

10 REM Start of input routine
INPUT "Type your FIRST name: ";LINE FIRSTS
PRINT
INPUT "Now, type your LAST name: ";LINE LASTS
PRINT
INPUT "Type the year of your birth: ";BIRTH
PRINT
INPUT "Type THIS year: ";YEAR
PRINT
PRINT "Type the amount of salary you would like to"
PRINT "earn next year (any figure up to $9 million)"
PRINT "Go ahead, be greedy! USE FIGURES ONLY WITHOUT"
INPUT "DOLLAR SIGNS OR COMMAS (Example: 234567.00)";SALARY
PRINT
INPUT "Type any number from 1 to 999: ";NUMBER1
PRINT
INPUT "Type another number from 1 to 999: ";NUMBER2
PRINT
INPUT "And one more time, from 1 to 999: ";NUMBER3
GOSUB 10000 REM clear screen
PRINT #1;FIRSTS,LASTS,BIRTH,YEAR,SALARY,NUMBER1,NUMBER2,NUMBER3
REM          Above line puts your input into file as one record
REM          with 8 fields (2 string & 6 numeric).
CLOSE 1 REM Close the file. This STORES your input.
OPEN FILE$ AS 1 REM Immediately re-open the file so it
REM          can be read out. The inputs are read
REM          into computer memory (at line 100) but
REM          your original inputs are still stored
REM          in the EXAMPLES.FIL file.

```

CALL OR WRITE TODAY!

ELEPHANT
DISKS

SS/SD \$16.95

10 @ ... \$19.95

SS/DD \$25.95

10 @ ... \$25.95

Inventory Selections
...just to name a few!
(We also have IBM, Atari and
Commodore to keep your Hardware
on the "FAS-TRACK")

ULTIMA III	\$36.95
BEAGLE BAG	19.95
FLEX TEXT	19.95
FRAME-UP	19.95
TIP DISK #1 OR TYPEFACES	13.95
BOUNCING KAMUNGAS	13.95
PLANETFALL OR ENCHANTER	32.95
MOST AMAZING THING	26.95
COVETED MIRROR OR MINIT MAN	13.95
SNOOPER TROOPS 1 OR 2	29.95
QUEST OR TRANSYLVANIA	13.95
LODE RUNNER	23.95
COSMIC BALANCE I OR II	EA. 25.95
ZORK I, II OR III	EA. 24.95
DEADLINE, SUSPENDED OR WITNESS	32.95
STARCROSS	25.95
STELLAR 7	24.95
WIZARDRY	32.95
KNIGHT OF DIAMONDS	22.95
ZAXXON	25.95
PFS: FILE	79.95
PFS: REPORT	79.95
PFS: GRAPH	79.95
PFS: WRITE	79.95
RHYMES & RIDDLES	20.95
LEGACY OF LLYLGAMYN	26.95
CHIVALRY	26.95
STICKY BEAR SHAPES	26.95
MINER 2049ER	25.95
STICKY BEAR OPPOSITES	26.95
LEARNING WITH LEEPER	24.95
STICKY BEAR BASKETBOUNCE	26.95
GRAPHICS MAGICIAN	38.95
STICKY BEAR BOP	26.95
STICKY BEAR NUMBERS	26.95
STICKY BEAR ABC	26.95
FACE MAKER	22.95
STORY MACHINE	22.95
BANK STREET WRITER	43.95
CAVERNS OF CALLISTO	22.95
SENSIBLE SPELLER	78.95
SCREEN WRITER II	81.95
ESSENTIAL DATA DUPLICATOR	55.95
SARGON III	34.95
PRONTO DOS	19.95
DOUBLE TAKE	22.95
ALPHA PLOT	24.95
APPLE MECHANIC	19.95
BEAGLE BASIC	23.95
DOS BOSS	15.95
HOME ACCOUNTANT	47.95
THE GENERAL MANAGER II	148.95
VISCALC 3.3	164.95
KOALA PAD	87.95
VISITREND/PILOT	198.95
INCREDIBLE JACK	124.95
UTILITY CITY OR DISKQUICK	19.95
QPLE	32.95
ZARDAX	154.95
COPY II PLUS	22.95
MAGIC WINDOW II	93.95
HOMEWORD	34.95
ORCA/M	99.95
WORDSTAR	268.95

Personal checks allow 2 weeks. We accept Visa & MasterCard
(add 3% for handling). Send or call with card # & exp date in-
clude \$2.00 for shipping. Ohio residents add 5-1/2% state sales tax.
Prices are subject to change without notice.

FAS-TRACK
COMPUTER PRODUCTS
Box 456
Columbus, Ohio 43216
(614) 863-1699
OR TOLL-FREE OUTSIDE OHIO
1-800-272-1600

S J B

imple !
ust
uy the system
complete and **SAVE.**

GOOD SYSTEM

\$485.00

- C64 COMPUTER
- 1530 DATASETTE RECORDER
- 1525 GRAPHIC PRINTER
- (ALL NECESSARY CABLE INCLUDED)

BETTER SYSTEM

\$859.00

- C64 COMPUTER
- 1541 DISK DRIVE
- GEMINI 10X PRINTER
- CARDCO PARALLEL INTERFACE
- VEREX DISKS (BOX OF 10)
- (ALL NECESSARY CABLES INCLUDED)

BEST SYSTEM

\$1149.00

- C64 COMPUTER
- MSD SUPER DISK (HEAVY DUTY)
- TRANSTAR 120 (80 COL, 14 CPS, LQ)
- MW 302 PARALLE INTFC
- DATALIFE (BOX OF 10)
- (ALL NECESSARY CABLES INCLUDED)

*Full-line of business and educational software available
 *Add \$235.00 for CBM 1702 monitor with any of above systems
 *Commodore authorized dealer
 *Prices are subject to change without notice
 *C.O.D.'s accepted (Add \$5.00)

VISA/MASTERCARD
 MONEY ORDERS
 BANK CHECK



SJB DISTRIBUTORS, INC.
 10520 Plano Rd., Suite 206
 Dallas, Texas 75238
 (800) 527-4893 or
 (800) 442-1048 in Texas

CIRCLE 166 ON READER SERVICE CARD

CBasic Clinic, continued...

```
GOTO 100 REM Go to pre-printout routine
20 REM start of printout
GOSUB 10000 REM Clear Screen
LPRINTER REM Direct following output to printer
PRINT "Okay, ";FS;" we are going to print out some"
PRINT "interesting facts and figures about you."
PRINT
LET AGE = Y - B
PRINT "As I compute it, you must be about";AGE;"years old."
PRINT
LET TOTAL = N1 + N2 + N3
LET AVERAGE = TOTAL/3
PRINT "You typed in three numbers, remember? Those numbers add"
PRINT "up to";TOTAL
PRINT "And the average of all three is:";AVERAGE
PRINT
PRINT " *****LOOK AT YOUR TERMINAL FOR INSTRUCTIONS*****"
PRINT:PRINT:PRINT
INPUT "Want formatted output? Just hit <return>";LINE DUMMYS
REM Above line will print on console NOT printer!
REM Then we go back to the printer after <return>.
PRINT:PRINT:PRINT
PRINT "This is a sample of formatted printing for ";FS;" ";LS
PRINT:PRINT
PRINT "The average of the three numbers entered is: ";AVERAGE
PRINT:PRINT
PRINT "The FORMATTED average is: ";
PRINT USING FORMAT1$;AVERAGE
PRINT:PRINT
PRINT "Let's space out the three numbers you entered:"
PRINT
PRINT USING FORMAT1$;N1;TAB(20);
PRINT USING FORMAT1$;N2;TAB(40);
PRINT USING FORMAT1$;N3
PRINT
PRINT "Here's another example of formatted printout:"
PRINT
LET SALARY = S
LET SALARY2 = SALARY/2
LET SALARY3 = SALARY/3
LET SALARY4 = SALARY/4
LET GRAND.TOTAL = SALARY + SALARY2 + SALARY3 + SALARY4
PRINT TAB(35);
PRINT USING FORMAT2$;SALARY
PRINT TAB(35);
PRINT USING FORMAT2$;SALARY2
PRINT TAB(35);
PRINT USING FORMAT2$;SALARY3
PRINT TAB(35);
PRINT USING FORMAT2$;SALARY4
PRINT
PRINT TAB(25);"TOTAL:";TAB(35);
PRINT USING FORMAT2$;GRAND.TOTAL
PRINT:PRINT
PRINT "If all went well, the above should be lined up on"
PRINT "the decimal points."
PRINT:PRINT
PRINT "One last example of formatted printing:"
PRINT
PRINT "What is your salary (before taxes!)?"
PRINT
PRINT USING FORMAT3$;SALARY
PRINT:PRINT
PRINT " THIS IS THE END OF THE PROGRAM"
PRINT
PRINT " Type out your file to see how CBASIC stored"
PRINT " your inputs. (TYPE EXAMPLES.FIL or"
PRINT " TYPE B:EXAMPLES.FIL)"
CLOSE 1 REM Close file # 1
STOP REM End of main program. Start subroutines.
10000 REM Clear Screen Subroutine
FOR I% = 1 TO 24
PRINT
NEXT I%
RETURN REM Indicates end of subroutine

REM " **** IMPORTANT NOTE: If you want to run this program"
REM " again, you should erase the existing file "
REM " (ERA EXAMPLES.FIL or ERA B:EXAMPLES.FIL)."
REM " If you do not do this, the program is set up"
REM " to skip the input routine and go directly to"
REM " the printout routine."
```


BASF QUALIMETRIC™ FLEXYDISKS. A GUARANTEED LIFETIME OF OUTSTANDING PERFORMANCE.

BASF Qualimetric FlexyDisks feature a unique lifetime warranty, firm assurance that the vital information you enter on BASF FlexyDisks today will be secure and unchanged tomorrow. Key to this extraordinary warranted performance is the BASF Qualimetric standard... a totally new set of criteria against which all other magnetic media will be judged.*

You can count on BASF FlexyDisks because the Qualimetric standard reflects a continuing BASF commitment to perfection in magnetic media. One example is the unique two-piece liner in our FlexyDisk jacket. This BASF feature traps damaging debris away from the disk's surface and creates extra space in the head access area for optimum media-head alignment. The result is a guaranteed lifetime of outstanding performance.

For information security that bridges the gap between today and tomorrow, look for the distinctive BASF package with the Qualimetric seal. Call 800-343-4600 for the name of your nearest supplier.

CIRCLE 195 ON READER SERVICE CARD

*Contact BASF for warranty details.



ENTER TOMORROW ON BASF TODAY.

© 1983 BASF Systems Corp., Bedford, MA



BASF

Audio-Animation

Synchronized Sight and Sound for Atari Computers

Audio-Animation provides a vivid demonstration of the graphic and musical talents of the Atari computer. I run it on a system with 32K and a disk, but it should also run on a 24K disk system or with 8K and cassette.

The main graphics routine is based on the familiar dancing line algorithm. It draws webs of colored lines on the screen, and stores their endpoint coordinates in an array so that it can erase old lines as well as draw new ones. I have spiced up the algorithm in several ways.

First, I made it select new colors at random, instead of just using the four standard colors over and over again. If you watch the program for a while, you will probably be pleasantly surprised to see what a great variety of colors that Atari can produce: salmon pink, olive green, and charcoal gray to name but a few.

I have also written a routine that selects musical tones to correspond to the colors on the screen. Obviously, the problem of selecting pleasant sounds, or ones that are a "good match" with the colors, is a very subjective matter, so we

Kent A. Multer

can't expect the computer to have the aesthetic sense of a Van Gogh or a Bach. However, the results are quite good for a simple program.

There are four colors on the screen, so one sound channel is assigned to each color register. The pitch of each channel is selected by the color number, and the loudness of the tone is selected by the brightness.

The program shifts randomly among five different *harmonic modes*, sets of notes that are related in some way. The

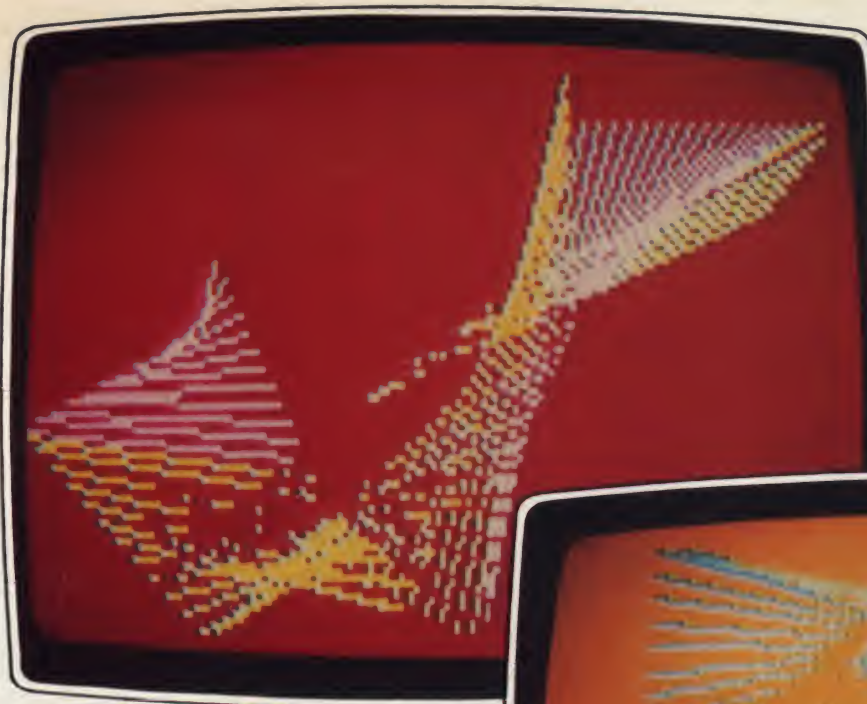
***The problem of
selecting pleasant
sounds, or ones that
are a "good match"
with the colors, is a
very subjective matter.***

five modes are defined by the five rows of the matrix FRQ and by the DATA statements that load it. The modes are:

- 0-Harmonic sequence. Note 2 is twice the frequency of note 1. Note 3 is 3 times note 1, etc.
- 1-Chromatic sequence. Consecutive notes are one semitone apart.
- 2-Parallel thirds. These correspond to every other note of the C major scale.
- 3-Diatonic sequence. A simple C major scale.
- 4-C major chord. C, E, and G, in all octaves.

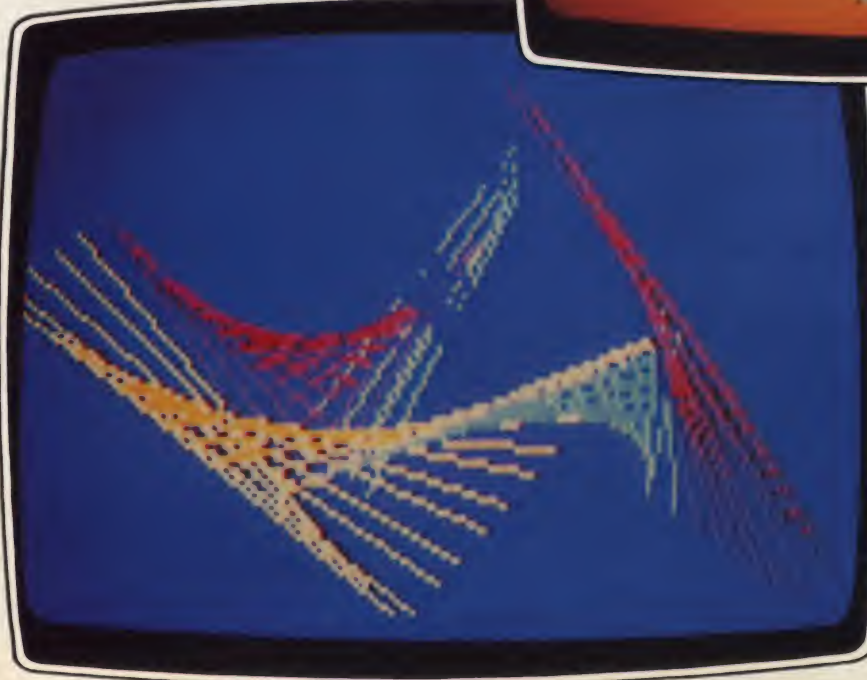
You will note that in all harmonic modes, color number 0 produces a pitch of 0 for the sound channel. Color 0 refers to white, black, and six shades of gray. A pitch of 0 has the effect of turning the sound channel off (apparently because it produces a note that is too high to hear). Thus the neutral colors (the grays) are accompanied by the neutral sound—silence.

In selecting the loudnesses of the other colors, I decided to make the lightest and darkest colors produce the quietest notes. My reasoning was that the lightest colors are almost white, and the darkest ones are almost black. Therefore, the ones in the middle must



be the most colorful (you might say loudest) colors, so they should produce the loudest sounds.

When switching to a new color, instead of a sudden flash, the program does a smooth fade by stepping through all intermediate values of color and brightness. The musical tone changes in step with the color. The speed of the fades is set by the delay factor that the program asks you to type in. Zero is the fastest. Using larger delay factors slows down the fades so that you can observe



them more closely.

To do the fades, the program stores the current colors and brightnesses in the arrays CHROM and LUM, respectively. This means that if you see (or hear) something that you really like, you can stop the program by hitting BREAK or SYSTEM RESET and print out the numbers in the array so you can use them in your own programs.

When you look at the program, you may wonder what line 1070 is for. It prevents the computer from going into "attract mode." (This term is a carry-over from the arcade game world, and refers to what a game does when it is sitting around not being played.) After about

nine minutes of running without any keys being pressed, the computer begins randomly switching all the colors every few seconds. This is supposed to save you from burning an image into the screen of your TV set if you should happen to walk away and forget to turn it off.

However, our program is *already* changing the colors every few seconds, so we don't need any help, thank you. Location 77 is used as a timer for attract mode, so by frequently resetting it to 0, we can prevent attract mode from messing up our display when we leave it running for a long time.

You may wish to modify this program, and try out your own ideas about how to generate pleasing combinations of colors and sounds. I trust that you will find Audio-Animation to be an eye- and ear-catching demonstration of the power of your computer.

HayesTM

Your Apple's telephone.



"Thanks for the prompt reply. Sure was a lot faster than waiting for the mail!"



"Gary: The pedigrees for next week's auction are as follows..."



"Attn. Prod., Sales, Purch.: Recommend 50% blue, 30% red screen for closest match!"

A complete plug-in communications system for Apple® computers. From Hayes, the established telecomputing leader: the simple but sophisticated Micromodem II® plug-in board modem and its companion software, Smartcom I.TM Everything you need to expand the world of your Apple II, IIe, II Plus and Apple III. In one, convenient communications package.

With Micromodem IIe and Smartcom I, you can access data bases, bulletin boards, and the varied resources of information services. Plan your travel itinerary via computer, including flight numbers, hotel and rental car reservations. Retrieve and analyze daily stock and options prices. Work at home and send reports to your office. You can even do your gift shopping by computer!

Micromodem IIe. Think of it as your Apple's telephone. It allows your computer to communicate with any Bell-103 type modem over ordinary telephone lines, at 110 or 300 bits per second. Micromodem IIe installs easily in an expansion slot, and requires no outside power source. It connects directly to either a single or multiline modular phone jack, to perform both Touch-Tone® and pulse dialing.

Micromodem IIe dials, answers and disconnects calls automatically. And, unlike some modems, it operates in full or half duplex, for compatibility with most time-sharing systems.

A built-in speaker lets you monitor your



calls when dialing. That way, you'll know if a line is busy. With Smartcom I, Micromodem IIe automatically redials your last number.

Discover how Micromodem IIe can help maximize the capabilities of your Apple. While Smartcom I software will minimize your efforts.

Smartcom I companion software.

For effortless communications.

Whether you're a newcomer to personal computing or a seasoned professional, you'll appreciate the ease and speed with which you can perform any communications function. Thanks to Smartcom I!

Let Smartcom I guide you through a few easy-to-answer questions to tailor the program to your particular needs. Then you're ready to go!

Make a selection from the Smartcom I menu to manage your communications, files or printer. Program prompts guide you along the way. And menu selections let

you easily make a call, end a call, or answer a call. When you're on the receiving end, your Micromodem IIe answers automatically, even if you're not there!

Convenient! And so is the Smartcom I memory for phone numbers. Smartcom I stores three of your most frequently called telephone numbers and one prefix. Plus, it also remembers the last number dialed.

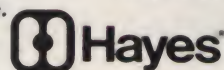
Smartcom I also provides a directory of the files stored on your disk. And lets you create, list, name, send, receive, print or erase files right from its menu.

Smartcom I is as versatile as you need it to be. It accepts DOS 3.3, Pascal, CP/MTM 3.0 or CP/M PlusTM operating systems. And accommodates up to six disk drives and several printer interface cards.

Like all our products, Smartcom I and Micromodem IIe are backed by excellent documentation and full support. Including a two-year limited warranty on Micromodem IIe and a 90-day warranty on Smartcom I!

See your dealer today. Then plug into the exciting world of telecomputing.

Hayes Microcomputer Products, Inc.,
5923 Peachtree Industrial Blvd., Norcross,
Georgia 30092. 404/441-1617.



FCC approved in U.S.A. Micromodem IIe is a registered trademark of Hayes Microcomputer Products, Inc. Smartcom I is a trademark of Hayes Microcomputer Products, Inc. Apple is a registered trademark of Apple Computer, Inc. Touch-Tone is a registered service mark of American Telephone and Telegraph. CP/M is a trademark of Digital Research, Inc. CP/M Plus is a trademark of Advanced Logic Systems. ©1983 Hayes Microcomputer Products, Inc.

Listing 1.

```

3 REM
4 REM
5 REM "Audio-animation" adapted by Kent A. Multer.
6 REM Main Program by T. G. Marshall.
7 REM
10 ? "How many lines?":INPUT W
15 ? "Delay factor?":INPUT TIME
20 DIM X1(W),Y1(W),X2(W),Y2(W):DIM R(4)
25 DIM CHROM(4),LUM(4)
30 FOR I=0 TO W:X1(I)=0:Y1(I)=0:X2(I)=0:Y2(I)=0:NEXT I
35 GOSUB 500
46 GRAPHICS 23:A=-1:NXTCOL=3:DRCOL=0:HARMONY=1
48 FOR I=0 TO 4:CHROM(I)=0:LUM(I)=0:SETCOLOR I,0,0:NEXT I
50 X1(W)=80:Y1(W)=40:X2(W)=100:Y2(W)=30
60 FOR I=1 TO 4:R(I)=1.5*(INT(RND(0)*7)-3):NEXT I
80 GOSUB 1000
90 DRCOL=DRCOL+1:IF DRCOL=4 THEN DRCOL=1:COLOR DRCOL
110 FOR COUNTER=1 TO INT(RND(0)*10)+10
120 A=A+1
130 IF A=0 THEN U=W:GOTO 150
140 U=U-1
150 X1(A)=X1(U):Y1(A)=Y1(U):X2(A)=X2(U):Y2(A)=Y2(U)
160 X1(A)=X1(A)+R(1):Y1(A)=Y1(A)+R(2):X2(A)=X2(A)+R(3):Y2(A)=Y2(A)+R(4)
170 IF X1(A)>159 OR X1(A)<0 THEN R(1)=-R(1):X1(A)=X1(A)+R(1)
172 IF Y1(A)>95 OR Y1(A)<0 THEN R(2)=-R(2):Y1(A)=Y1(A)+R(2)
174 IF X2(A)>159 OR X2(A)<0 THEN R(3)=-R(3):X2(A)=X2(A)+R(3)
176 IF Y2(A)>95 OR Y2(A)<0 THEN R(4)=-R(4):Y2(A)=Y2(A)+R(4)
180 PLOT X1(A),Y1(A):DRAWTO X2(A),Y2(A)
190 IF A=W THEN R=0:GOTO 210
200 R=R+1
210 COLOR 0:PLOT X1(R),Y1(R):DRAWTO X2(R),Y2(R):COLOR DRCOL
220 IF A=W THEN A=-1
230 NEXT COUNTER:GOTO 60
496 REM
497 REM =====
498 REM Initialization routine for the the harmony matrix.
499 REM
500 DIM FRQ(4,15)
510 FOR I=0 TO 4:FOR J=0 TO 15:READ F:FRQ(I,J)=F:NEXT J:NEXT I
520 RETURN
536 DATA 0,243,121,81,60,47,40,33,29,53,96,82,162,144,136,128
537 DATA 0,243,230,217,204,193,182,173,162,153,144,136,128,121,114,108
538 DATA 0,243,193,162,128,108,91,72,60,47,40,31,53,91,144,243
539 DATA 0,121,108,96,91,81,72,64,60,53,47,45,40,35,31,29
540 DATA 0,243,193,162,121,96,81,60,47,40,29,243,193,162,121,96
996 REM
997 REM =====
998 REM Color selection and fading subroutine.
999 REM
1000 NXTCOL=NXTCOL+1
1001 IF NXTCOL=3 THEN NXTCOL=4
1002 IF NXTCOL=5 THEN NXTCOL=0
1005 IF NXTCOL=4 THEN FOR I=1 TO 999:NEXT I
1010 CNEW=INT(RND(0)*16):LNEW=2*INT(RND(0)*8)
1015 IF CNEW=CHROM(4) AND LNEW=LUM(4) THEN 1010
1017 IF INT(RND(0)*12)=0 THEN HARMONY=HARMONY+1:IF HARMONY=5 THEN HARMONY=0
1020 CHROM(NXTCOL)=CHROM(NXTCOL)+SGN(CNEW-CHROM(NXTCOL))
1030 LUM(NXTCOL)=LUM(NXTCOL)+2*SGN(LNEW-LUM(NXTCOL))
1040 SETCOLOR NXTCOL,CHROM(NXTCOL),LUM(NXTCOL)
1045 GOSUB 2000
1050 FOR I=1 TO TIME:NEXT I
1060 IF LUM(NXTCOL)<>LNEW OR CHROM(NXTCOL)<>CNEW THEN GOTO 1020
1070 POKE 77,0
1080 RETURN
1996 REM
1997 REM =====
1998 REM Musical tone selection subroutine.
1999 REM
2000 CHANNEL=NXTCOL:IF CHANNEL=4 THEN CHANNEL=3
2010 VOL=8-ABS(LUM(NXTCOL)-8)
2020 SOUND CHANNEL,FRQ(HARMONY,CHROM(NXTCOL)),10,INT(3/4*VOL)+2
2030 RETURN

```

This program is available on Atari disk or cassette for \$10.00. Order from Magic Metal Productions, P.O. Box 496, Wilton, NH 03086.

Happy Hands

Offers Discounts on All

TRS-80TM COMPUTERS

We Have What You Are Looking For

Free Shipping Within United States

- 100% New Original Equipment
- Prices Comparable to Any Other
- No Tax On Out of State Shipments

For Prices and Shipping Information

Call Toll Free

1-800-545-9019

N.M. Residents Call 257-7865

or write

HAPPY HANDS

P.O. DRAWER I

RUIDOSO, NEW MEXICO

88345

CIRCLE 183 ON READER SERVICE CARD

LEARN COMPUTER REPAIR

Train at home in spare time...
No previous experience needed

Sales of small computers are running over a billion dollars a year. That's why a whole new business is starting up—devoted entirely to small computer repair. And right now is the time to get in on the ground floor—either working for someone else or in your own computer repair business.

Start making money in electronics

No need to quit your job, change your daily routine or take time from family responsibilities. And you don't waste time going to and from class because you train at home in spare time. The ICS Microcomputer Repair Course is designed for beginners—people with no previous experience who want to get started fast. And you should be ready for an entry-level job repairing small computers even before you finish this course.



You receive microprocessor trainer, digital V.O.M. and much more included with course.

Experts show you what to do... how to do it! We start you fast with the basics, and everything is explained in easy-to-understand language complete with plenty of diagrams and drawings

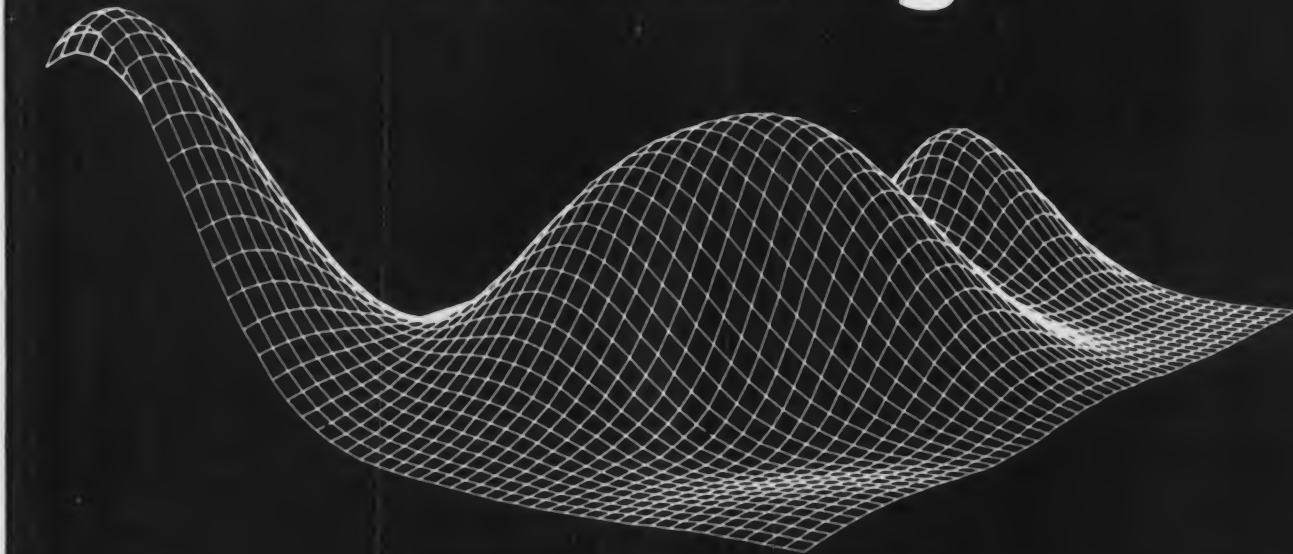
GET INTO SMALL COMPUTER REPAIR

SEND FOR FREE FACTS!

ICS School of Computer Training, Dept. DH014
SINCE 1981 Scranton, Pennsylvania 18515
Send free facts and color brochure telling how I can get into computer repair at home in my spare time. No obligation. No salesman will call.

Name _____ Age _____
Address _____
City/State/Zip _____

Curve Design



Kimball M. Rudeen

Writing a program to draw straight lines is not very difficult. There are several ways to draw lines connecting any arbitrary set of points. Curved lines are another problem entirely. When a programmer wants a curve, he usually must find some equation that will generate it for him. This is fine for circles, ellipses, or if your education in analytic geometry extends a bit further, parabolas and hyperbolas. But if the figure you want doesn't fit one of these categories, you have a problem.

I once tried to create a Valentine heart for my wife, using the spiral of Archimedes. This is a simple equation producing a spiral described as "one half of a heart shaped figure." Draw two of these spirals from the same point, one clockwise and one counter-clockwise, and you have a heart. In theory, that is. In fact, what you have is a skinny thing that becomes a heart only after an evening of fudging, patching, and swearing.

Fortunately, there is a better way. I recently took a very good course in computer graphics, courtesy of my employer. This course presented several methods for constructing and shaping curves. This article describes one of the simpler methods, parabolic blending.

Parabolic blending begins with a means of generating a parabola connecting three arbitrary points. Suppose we wish to draw a line between two points (XA,YA) and (XB,YB). This can be done using the equations

$$X = XB * T + XA * (1 - T)$$

and

$$Y = YB * T + YA * (1 - T)$$

This can be more compactly expressed as the single equation
(1) $(X(T), Y(T)) = (XB, YB) * T + (XA, YA) * (1 - T)$

As the value of T goes from 0 to 1, the value of the two equations will range from (XA,YA) to (XB,YB). For T between 0 and 1, the two equations will produce points on the straight line connecting the two points. This method is known as parametric representation. The X and Y values of the line are defined as functions of a third value, the parameter T.

Parametric representation uses three points to define a parabola. The parametric equations for a parabola are as follows:
(2) $(X(T), Y(T)) = (XA, YA) * (TB - T) * (TC - T) / ((TB - TA) * (TC - TA)) +$
 $(XB, YB) * (TA - T) * (TC - T) / ((TA - TB) * (TC - TB)) +$
 $(XC, YC) * (TA - T) * (TB - T) / ((TA - TC) * (TB - TC))$

for numbers TA, TB, TC. $TA < TB < TC$, and the parameter T starts at TA and goes through TB to TC. TA, TB, TC can have any convenient value so long as the relative order $TA < TB < TC$ is maintained. In this article, I shall call points of this kind *reference values*. Note that for $T = TA$, $(X(T), Y(T)) = (XA, YA)$ and similarly for $T = TB$ and $T = TC$. As T goes from TA to TC, the points generated fall on the unique parabola connecting (XA,YA), (XB,YB) and (XC,YC). In effect, the parabola is formed by generating a weighted average of the three points. Equation (1) is the parametric equation for a straight line, with reference values $TA = 0$ and $TB = 1$.

Parametric representation could be used to connect more than three points. This is done simply by following the pattern shown in equation (2), and forming functions using T and the reference values T_1, \dots, T_N such that for $T = T_1$, the function for (X1,Y1) is equal to 1 and the functions for all other points are equal to zero. Curves generated in this way will always pass through the set of points defining the curve. However, it is hard to see how to write a program which could generate all the functions for an arbitrary number of points. Also, the curves generated in this way tend to be very "wiggly." That is, while the curve will go through the points (X1,Y1) through (XN,YN), in between it is liable to take on extremely large or small values of

A LITTLE SPIRIT CAN GIVE YOU EXTRAORDINARY PRINTING POWER.



\$399*

Spirit's the microprinter that lets you do more things yourself. And do each of them letter perfect. It prints standard, bold, expanded and condensed type faces. Even *italics*. And finely etched graphics. All because every impression has a crisp, square edge to it for unmistakable clarity.

That's the power to look perfect in print.

And a power that operates almost without sound. The Quietpak option smothers printer noise. So Spirit rushes through work with barely a whisper.

There's also the power to manage paper. Variable width tractors adjust for narrow jobs like labels. Or wider jobs like correspondence. All of which are handed to you immediately thanks to Spirit's Quick Tear edge.

When you can have your own personal microprinter that does so much for so little, aren't you powerless not to act?

For more information and the name of your nearest dealer, call toll-free: 800-447-4700. In Illinois, 800-322-4400.

In Canada, call 417-661-9783. *Manufacturer's suggested U.S. retail price with parallel interface.

CIRCLE 138 ON READER SERVICE CARD

**MANNESMANN
TALLY**

THE DO-IT-YOURSELFERS' PROJECT ASSISTANT

BY TOM & KELDA RILEY

THE COMPUTER CONTROLLER COOKBOOK



Save up to half the usual retail price building your own game controls that will last up to twice as long as most commercially purchased models with THE COMPUTER CONTROLLER COOKBOOK...the indispensable guide for computer game enthusiasts!

Make your own game controls...repair that old joystick that's been sitting in your closet...have your own project assistant in your home, ready when you are! The COMPUTER CONTROLLER COOKBOOK gives you complete schematics and mechanical drawings for building and repairing joysticks, paddles and game devices for your Apple® or Atari® computer, with a special section showing you how to adapt these to most major machines. Imagine building your own Super Joystick, Annunciator, Airplane Wheel, Foot Pedals, Sketch Pad or Multiple Connector from purchased *and* scavenged parts and then using them on your own computer! Imagine saving up to half the cost of usual commercial prices and having your controls last up to twice as long! Imagine the hours of enjoyment and learning you'll get from the COMPUTER CONTROLLER COOKBOOK!

Order your copy today!

Apple is a registered trademark of Apple Computer Inc. Atari is a registered trademark of Atari Inc.

CREATIVE COMPUTING PRESS Dept. MA1F 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me _____ COMPUTER CONTROLLER COOKBOOK(s) at \$11.95* plus \$2.00 postage and handling each. Outside U.S.A. add \$3.00 per order. #8C.

☐ Payment enclosed \$_____. *Residents of CA, NJ, and NY State add applicable sales tax.

☐ Charge my:

☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Signature _____

Mr./Mrs./Ms. _____
please print name in full

Address _____

City _____

State _____ Zip _____

**For faster service, PHONE TOLL FREE
1-800-631-8112**

(In NJ call 201-540-0445)

☐ Send me a FREE Creative Computing Press Catalog.

Curve Design, continued...

(X,Y). This method is therefore not very useful for graphic curve generation.

Another possibility is to construct a curve connecting a set of points out of parabolas by drawing a parabola first from P1 to P2 to P3, then from P3 to P4 to P5, and so on. But this approach would not connect an even number of points. Also, the curve generated tends to have cusps, or sharp corners, where the parabolas join.

Blending Parabolas

The way to get more than a simple parabola between three points is by blending pairs of parabolas together. As an example, consider Figure 1. Two overlapping parabolas have been drawn between points P1, P2, P3 and P2, P3, P4. This was done by applying equation (2) to P1, P2, P3, and P2, P3, P4 and using reference values 1.0, 2.0, 3.0, 4.0. The first parabola was generated using reference values 1.0, 2.0, 3.0 and the second using reference values 2.0, 3.0, 4.0. Now comes the blending. This is done in much the same manner as was used to draw a straight line between two points in equation (1). However, instead of applying to two single points, the method is applied to pairs of points. There are two steps to the process.

First, as T goes from T2 to T3, it is applied in two separate parabolic equations of type (2) to generate points (XF(T), YF(T)) and (XS(T), YS(T)) on the first and second parabolas.

Next, the same value of T is used in the following equation to blend the two points into one point:

$$(3) \quad (X(T), Y(T)) = (XS(T), YS(T)) * (T - T2) / (T3 - T2) + (XF(T), YF(T)) * (T3 - T) / (T3 - T2)$$

which for reference values T2=2.0, T3=3.0 becomes

$$(X(T), Y(T)) = (XS(T), YS(T)) * (T - 2.0) + (XF(T), YF(T)) * (3.0 - T)$$

As T goes from 2.0 to 3.0, the points generated by equation (3) range from (XF(2.0), YF(2.0))=P2 to (XS(3.0), YS(3.0))=P3. The blending process uses a single value of T to compute first two points on two parabolas and then uses the same value of T to combine these points into a single point.

The curve generated by this blending is shown by the dotted line in Figure 1. Notice that the dotted line merges smoothly into the curves ending at P2 and beginning at P3.

For an arbitrary set of points P1, P2, ..., PN it is necessary to generate a set of parabolas connecting first P1, P2, P3, then P2, P3, P4 and so on. Then the parabolas must be blended between P2 and P3, etc. where they overlap. In two places, between the first two and last two points, only a single parabola is generated. However, these single parabolas will merge smoothly with the blended curves.

Generating this set of parabolas requires a set of reference values T1, T2, ..., TN for the parabolic equations. Again, the only requirement is that $T1 < T2 < \dots < TN$. Values of T must be generated from T1 to TN, and then loaded into parabolic and blending equations of form (2) and (3). For any value of T, we can determine the correct equations to use from the position of T on the T1-TN range. Any value on this range will be bracketed by two reference values. For example, at some time we have $T5 < T < T6$. Then the reference values to use at this time are T4, T5, T6 for the first parabola, connecting points P4, P5, P6, and T5, T6, T7 for the second parabola, connecting points P5, P6, P7.

Generating A Closed Curve

The curve generated in this way is open. That is, it begins at one point and ends at another, separate point. This same method can be used to generate a curve that is closed, beginning and ending at P1. It might seem to be enough just to load P1 in as an extra point and connect points P1, ..., PN, P1. However, this does not quite do the job. For an open curve, there is only one parabola between points P1, P2 and between points PN-1, PN, as was mentioned earlier. Also, there is no need to draw a curve between points P1 and PN. With a closed curve, it is necessary to

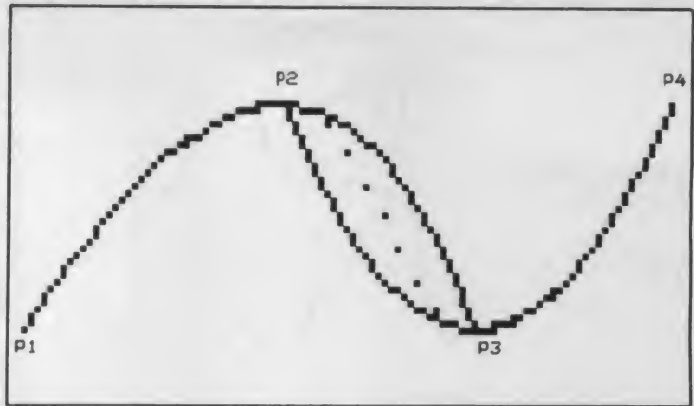


Figure 1.

generate and blend overlapping parabolas for every pair of points. For points P1 and P2, we can blend the two parabolas connecting points PN, P1, P2 and points P1, P2, P3. For points PN-1 and PN, we can blend the two parabolas connecting points PN-2, PN-1, PN and points PN-1, PN, P1. Finally, for points PN and P1, we can blend the two parabolas connecting points PN-1, PN, P1 and points PN, P1, P2. This requires loading PN into the point list as a new first point, and P1 and P2 as new last points.

So, we end up using points PN, P1, ..., PN, P1, P2 to generate the closed curve. The curve begins and ends at P1. The additional points inserted in the list as shown will provide the data to generate and blend parabolas between every pair of points defining the curve.

Continuous CHECKS, Statements, and Invoices for Desk-Top Computers

- Compatible with software from over 300 sources. Or program to NEBS standard forms yourself.
- Continuous Micro-Perf™ Letterheads and matching continuous Envelopes provide a clean, trim look.
- Also continuous labels, diskettes, other supplies and accessories.
- Our policy is to process forms printed with your name *within 6 working days*. Then ship direct to you (we pay shipping charges on prepaid orders).

**SMALL QUANTITIES • QUALITY PRODUCTS
LOW PRICES • MONEY-BACK GUARANTEE**

FREE full-color, one-stop catalog

fast service by mail or phone

TOLL FREE 1 + 800-325-1117

(Mass. residents 1 + 800-448-4688)

G8A 84.3

CODE 14010

**Nebs
Computer Forms**

12 South Street, Townsend, Massachusetts 01469

A division of
New England
Business
Service, Inc.

CIRCLE 143 ON READER SERVICE CARD

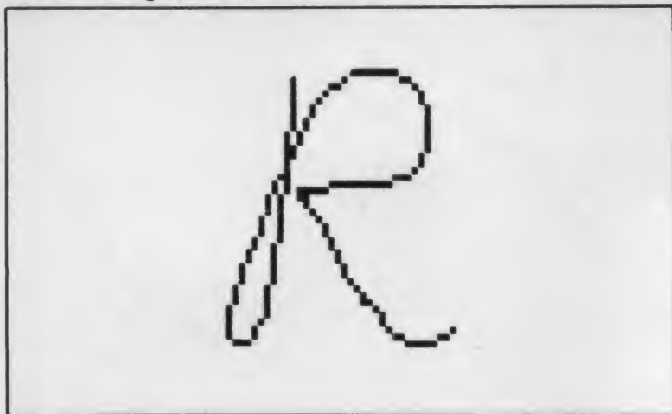


Figure 2.

The Program

Listing 1 is a program implementing parabolic blending to draw curves. It was written for my computer, a TRS-80 Model III. There should be little difficulty in converting this program to other machines. The program generates a curve by computing a series of points lying on the curve and then connecting them by straight lines.

First, the points defining the curve to be drawn are input visually. A single screen pixel is turned on and can then be moved anywhere on the screen. The input subroutine uses the Model III numeric keypad as a control. This pad is laid out in the pattern:

```

7 8 9
4 5 6
1 2 3
0

```

Pressing a number key moves the pixel in the corresponding direction. For example, pressing the 8 key moves the pixel straight up one unit. Pressing the 9 key moves the pixel one unit up and one unit to the right. The pixel keeps moving as long as the key is depressed. Note: the continuously moving pixel is accomplished by using a special feature of the TRS-80 Model III. Users of other computers will have to implement this capacity differently. If it is left out, the pixel will move once every time a key is depressed. The X,Y location of the pixel is reported at the upper lefthand side of the screen. The pixel will not move off the screen on any side.

Pressing key 5 selects a point defining the curve to be generated. It will not move the pixel. The point selected will be marked by a

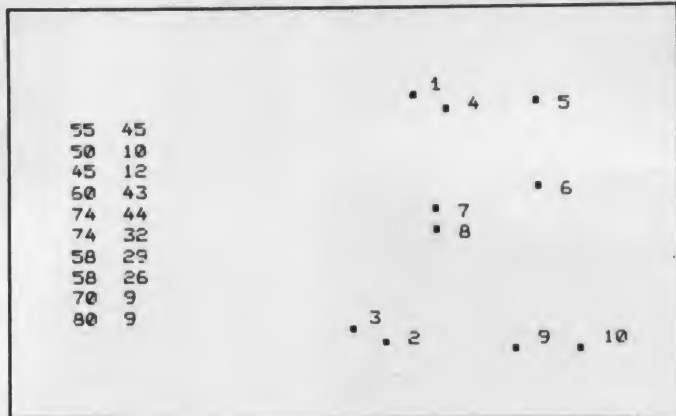
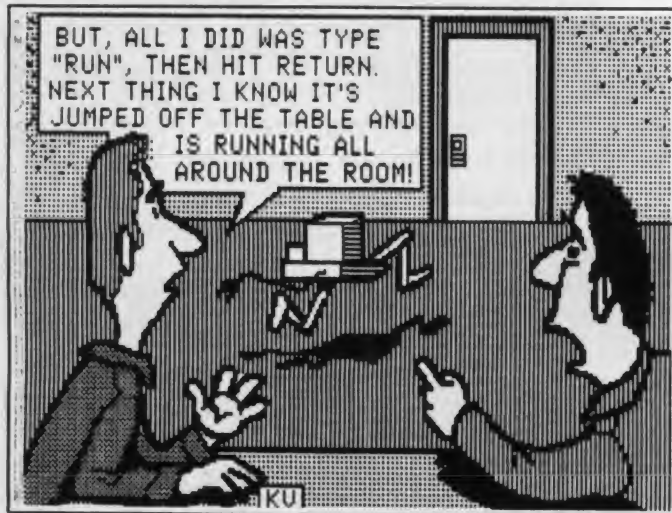


Figure 3.

set pixel. Pressing key 0 terminates visual point input.

This form of input is especially useful for curve design. It enables you to shape a curve intuitively by nudging points on a screen instead of refiguring X,Y coordinates. A few minutes of experimentation will give you a good feel as to what kind of curve is generated by a given set of points.

Once the points are entered, the program asks for the number of line segments making up the curve. There must be at least enough to connect every pair of points, or an error message is output and the number of segments is requested again. The more segments you allow, the longer the curve will take to draw and the more precise it will be.

Next, the program sets the control points defining the curve on the screen and branches to the appropriate subroutine to generate an open or closed curve. Both open and closed curve subroutines generate reference points T_1, \dots, T_N and a series of T parameter values. For convenience, the reference values are 1.0, 2.0, ..., up to N . This greatly simplifies equations (2) and (3), since many of their factors are reduced to constant whole numbers like 1.0.

The open curve subroutine generates and blends two sets of parabolic points together, except for the two cases in which only one parabola exists. It then calls the line-drawing subroutine to connect the previous point to the new point.

The closed curve subroutine first loads additional points into the set of control points defining the curve to close it, as was described earlier. The subroutine then generates and blends parabolic points together and calls the line-drawing subroutine.

The subroutine which generates the parabolas uses equation (3) in three steps. Again, notice that this equation has been simplified by the reference values used.

Following curve generation, the program asks whether you want to draw the curve again with a different number of segments or start a new curve. Any answer other than yes or no will terminate the program.

Parabolic blending allows you to shape curves directly, without trying to come up with an equation to do the job. Figure 2 is a cursive R which I was able to draw in only a few minutes. Only ten control points were required, and I am sure it could be done with fewer. The control points generating the R are shown in Figure 3, numbered in the order they are connected. Ninety line segments were used for the curve.

It is possible to generate straight lines with this program. A set of three points only, set in a straight line, will be connected by a very flat parabola identical to a straight line. Straight lines can be included in a curved figure by setting five points in a straight line. The straight line would be between the inner three points.

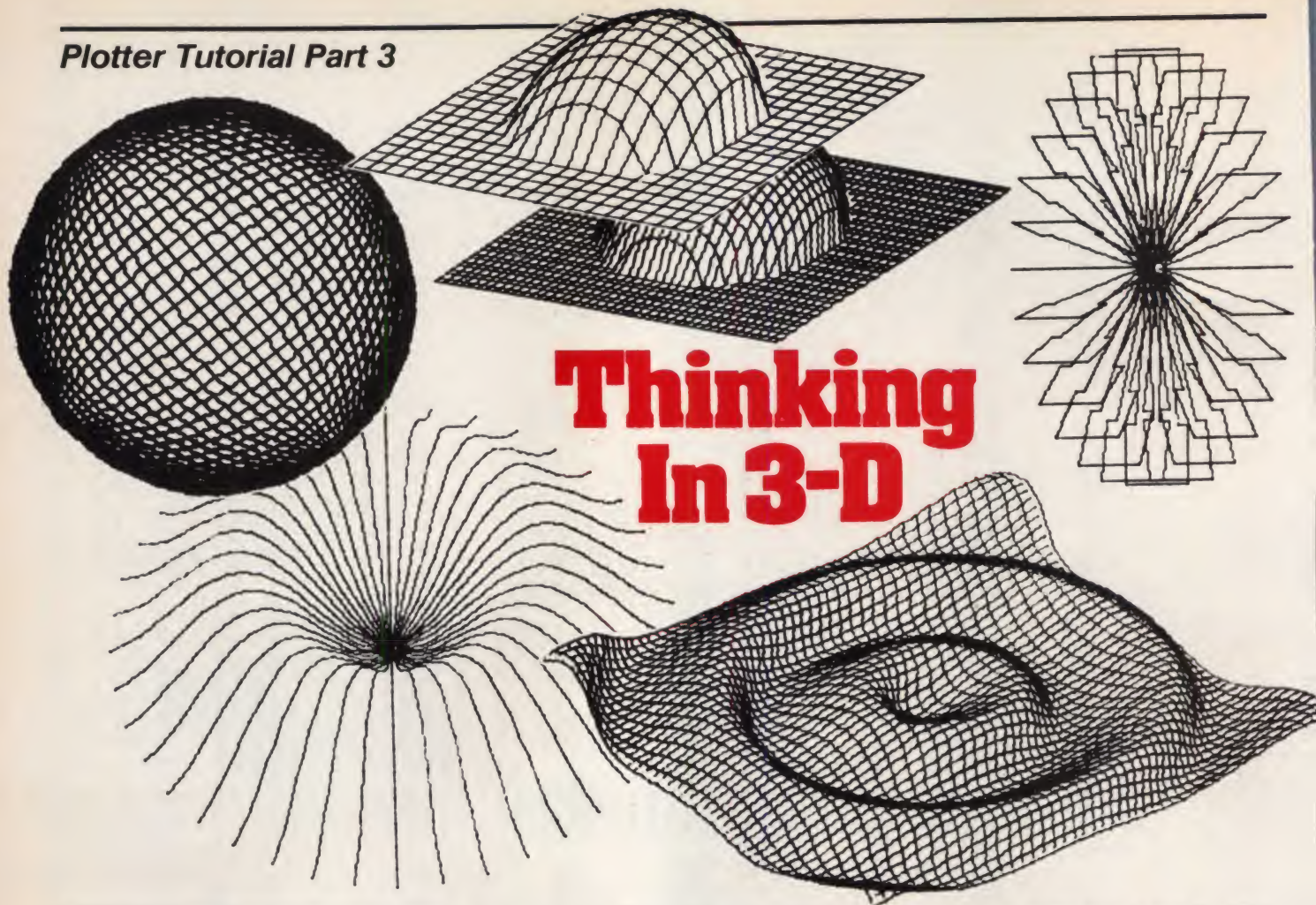
With parabolic blending and visual input, you are free to think about the curve you want to draw while the computer does the dirty work.

Listing 1.

```

100 CLS
110 DEFINT A-R
120 DIM XA(100),YA(100),IX(2),IY(2),X(2),Y(2)
130 PRINT "INPUT POINTS";
140 FOR I=1 TO 500:NEXT I
150 CLS
160 GOSUB 5000
170 PRINT @0,"NUMBER OF SEGMENTS";
180 INPUT NS
190 PRINT @0,"OPEN (1) OR CLOSED (2) CURVE";
200 INPUT A
210 IF NS=NP-1 AND A=1 THEN 240
220 IF NS=NP AND A=2 THEN 240
230 GOTO 250
240 CLS:GOTO 170
250 CLS
260 FOR I=1 TO NP
270 SET(XA(I),47-YA(I))
280 NEXT I
290 IF A=1 THEN GOSUB 1000
300 IF A=2 THEN GOSUB 2000
310 A$=INKEY$:IF A$="" THEN 310
320 PRINT @0,"REPEAT CURVE";
330 INPUT A$
340 IF A$="NO" THEN 130
350 IF A$="YES" THEN CLS:GOTO 170
360 END
995 REM OPEN CURVE
1000 IX(1)=INT(XA(1)+.5)
1010 IY(1)=INT(YA(1)+.5)
1020 MT=NP-1:TS=MT/NS
1030 FOR IC=1 TO NS
1040 T=TS*IC+1.0
1050 IF T>NP THEN T=NP
1060 TK=INT(T)
1070 IF T(2) THEN 1090
1080 TP=TK-1:GOSUB 3000 :X(1)=X:Y(1)=Y
1090 IF T(NP-1) THEN 1110
1100 TP=TK:GOSUB 3000 :X(2)=X:Y(2)=Y
1110 IF T=2 THEN 1150
1120 IX(2)=INT(X(2)+.5)
1130 IY(2)=INT(Y(2)+.5)
1140 GOTO 1220
1150 IF T(NP-1) THEN 1190
1160 IX(2)=INT(X(1)+.5)
1170 IY(2)=INT(Y(1)+.5)
1180 GOTO 1220
1190 LT=INT(T):RT=INT(T+1.0)
1200 IX(2)=INT(X(2)+(T-LT)+X(1)*(RT-T)+.5)
1210 IY(2)=INT(Y(2)+(T-LT)+Y(1)*(RT-T)+.5)
1220 GOSUB 4000
1230 NEXT IC
1240 REM CLOSED CURVE
1995 REM CLOSED CURVE
2000 IX(1)=INT(XA(1)+.5)
2010 IY(1)=INT(YA(1)+.5)
' COMPUTE T PARAMETER INCREMENT
' LOAD ADDITIONAL
' POINTS TO CLOSE
' THE CURVE
MT=NP:TS=MT/NS
XA(0)=XA(NP):YA(0)=YA(NP)
2040 XA(NP+1)=XA(1):YA(NP+1)=YA(1)
2050 XA(NP+2)=XA(2):YA(NP+2)=YA(2)
2060 FOR IC=1 TO NS
2070 T=TS*IC+1.0
2080 IF T(NP+1) THEN T=NP+1
2090 TK=INT(T)
2100 TP=TK-1:GOSUB 3000 :X(1)=X:Y(1)=Y
2110 TP=TK:GOSUB 3000 :X(2)=X:Y(2)=Y
2120 LT=INT(T):RT=INT(T+1.0)
2130 IX(2)=INT(X(2)+(T-LT)+X(1)*(RT-T)+.5)
2140 IY(2)=INT(Y(2)+(T-LT)+Y(1)*(RT-T)+.5)
2150 GOSUB 4000
2160 NEXT IC
2170 RETURN
2995 REM GENERATE PARABOLA USING EQUATION (2)
3000 Z1=(TP-T+1.0)*(TP-T+2.0)/2.0
3010 Z2=-(TP-T)*(TP-T+2.0)
3020 Z3=(TP-T)*(TP-T+1.0)/2.0
3030 X=Z1*XA(TP)+Z2*XA(TP+1)+Z3*XA(TP+2)
3040 Y=Z1*YA(TP)+Z2*YA(TP+1)+Z3*YA(TP+2)
3050 RETURN
3995 REM DRAW STRAIGHT LINE
4000 LN=ABS(IX(2)-IX(1))
4010 IF ABS(IY(2)-IY(1))>LN THEN LN=ABS(IY(2)-IY(1))
4020 IF LN=0 THEN 4130
4030 XIN=(IX(2)-IX(1))/LN
4040 YIN=(IY(2)-IY(1))/LN
4050 X=IX(1)+.5:Y=IY(1)+.5
4060 FOR I=1 TO LN
4070 IF INT(X)<0 OR INT(X)>127 THEN 4100
4080 IF INT(Y)<0 OR INT(Y)>47 THEN 4100
4090 SET(IX(X),47-INT(Y))
4100 X=X+XIN:Y=Y+YIN
4110 NEXT I
4120 IX(1)=IX(2):IY(1)=IY(2)
4130 RETURN
4995 REM INPUT POINTS DEFINING CURVE
5000 X=0:Y=0:NP=0:P=0
5010 SET(X,47-Y):PRINT @0,X;Y;
5020 A$=INKEY$:IF A$="" THEN 5020
5030 N=VAL(A$)
5040 IF N=0 THEN 5170
5050 IF N(5) THEN 5090
5060 NP=NP+1
5070 XA(NP)=X:YA(NP)=Y:P=P+1
5080 GOTO 5020
5090 MOD=N-3*INT(N/3):DX=X+(MOD=1)-(MOD=0)
5100 DY=Y+(N(4)-(N(6)
5110 IF DX(0 OR DX)>127 THEN 5020
5120 IF DY(0 OR DY)>47 THEN 5020
5130 IF P=0 THEN RESET(X,47-Y) ELSE P=0
5140 X=DX:Y=DY:PRINT @0,X;Y;
5150 IF POINT(X,47-Y) THEN P=1 ELSE SET(X,47-Y)
5160 IF PEK(14591)>0 THEN 5090 ELSE 5020
5170 RETURN
' REPEAT KEY?

```

Thinking In 3-D

This is the third in our series of plotter tutorials. Like the second, it also uses the Radio Shack CGP-115 plotter.

This installment picks up and advances some of the two-dimensional mathematical concepts discussed in the first tutorial. It also shows how to display the plots on the screen of several different computers. This is often a useful technique to debug the output of a plotting program before committing it to paper. —DHA

Michiel van de Panne, Box 13, Site 16, SSI, Calgary, Alberta, Canada T2M 4N3.

Michiel van de Panne

Of all the things that are impressive about computers, graphics rank high on the list. The set of programs in this article will have your computer expressing its genius and thinking in three dimensions in no time at all. At the same time you will gain a new understanding of the way the graphics are made.

First, a word on using the programs. All the programs are intended to be used on a wide variety of machines with graphic capabilities. I have included routines for

using the programs with Apple II, TRS-80 Model I/III screen, TRS-80 Model I/III with CGP-115 plotter, and Color Computer with CGP-115.

To use the programs, simply type them in and add the appropriate lines given for your computer. In addition, fill in the values for XM and YM in line 16 with the values given in Table 1 for your machine and the program you are using. This last step is not necessary for machines using the CGP-115.

For those with other types of computers, it should be easy to write your own routine. If you are using a screen, follow the Apple modifications. Those with plotters should

	Apple		Model I/III	
Figure 1a	XM= .95	YM= .95	XM= .46	YM= .23
Figure 1b	XM= .95	YM= .95	XM= .46	YM= .23
Figure 1c	XM= .95	YM= .95	XM= .46	YM= .23
Figure 2	XM= .95	YM= .95	XM= .46	YM= .23
Figure 3	XM= .95	YM= .95	XM= .46	YM= .23
Figure 4	XM=1.2	YM=1.2	XM= .7	YM= .3
Figure 5	XM=1.2	YM=1.2	XM= .56	YM= .28
Figure 6	XM=1.15	YM=1.15	XM= .54	YM= .27
Figure 7	XM= .9	YM= .9	XM= .45	YM= .225
Figure 8	XM= .7	YM= .7	XM= .34	YM= .17
Figure 9	XM= .7	YM= .7	XM= .36	YM= .18

Table 1.

	Min X	Max X	Min Y	Max Y
Figure 1a	0	100	0	100
Figure 1b	-100	100	-100	100
Figure 1c	-100	100	-100	100
Figure 2	-90	90	-90	90
Figure 3	-100	100	-100	100
Figure 4	-75	75	-75	75
Figure 5	-110	110	-75	75
Figure 6	-115	115	-75	75
Figure 7	-140	140	-50	60
Figure 8	-150	150	-125	125
Figure 9	-175	175	-125	125

Table 2.

Plotter Tutorial, continued...

find the routines for the CGP-115 easy to translate.

Line 15 in your own modification should contain the start-up routines for your graphics device such as a clear screen or a create origin for a plotter. It should also contain the coordinates for the center of your screen or paper. Line 16 should contain appropriate scaling factors and will vary with each figure. Table 2 should help you decide on the values for this. For example, the coordinates of the plot in Figure 1b vary from -100 to 100 in both X and Y directions. To put this on a screen of 160 by 160 pixels, you would indicate XC (X center) and YC (Y center) in line 15 as 80. XM and YM in line 16 would both be 0.8 so that the 200 by 200 plot would be reduced to fit the 160 by 160 screen size. Lines 1000 and on should contain a routine to move to a point or draw a line to a point given by X and Y. They should be followed by a RETURN.

The only other recommendation is to make the step size in the programs larger for those computers that have a lower resolution, such as the TRS-80 Model I/III screen.

Now to start with the actual figures. The figures progress in complexity from Figure 1a, a curve formed by straight lines, to the three dimensional objects depicted in Figures 5, 6, 7, and 9 which all rank about equally in difficulty. If you plan on understanding how one of the harder figures is drawn, follow the explanations of the figures from the beginning. On the other hand, if you couldn't care less about the trigonometry involved, you can still benefit from the programs without knowing the principles behind them.

Smooth Curve

To begin with, Figure 1a is simply a smooth curve that is formed by drawing a set of straight lines. Some of you have undoubtedly constructed this type of figure before. It is also somewhat reminiscent of the string art discussed in our first tutorial. The math involved in this figure is simple enough. The first line is a vertical line. For each successive line, the line starts a given step lower while the line ends the same step farther to the right.

Instead of stopping at this point, a much more interesting figure can be made by placing four of the same curves back to back. The resulting star pattern is shown

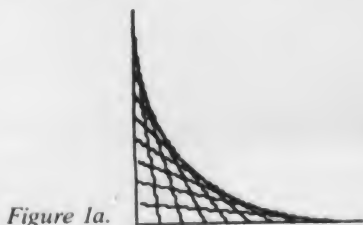


Figure 1a.

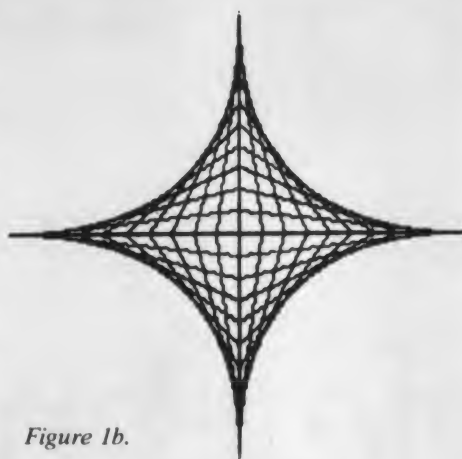


Figure 1b.

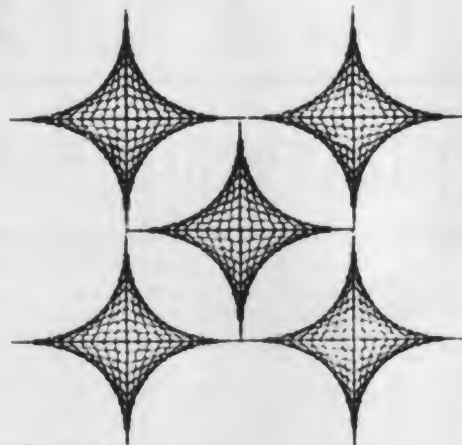


Figure 1c.

in Figure 1b. But why stop here? Place five of the star patterns together, and the much more attractive pattern in Figure 1c can be made.

Note how a simple curve can be used many times over to create a complex pattern. This is the technique that is used frequently in graphics. By repeating a simple pattern to form larger patterns and then repeating these larger patterns to form even larger ones, a complex, symmetrical pattern can be created.

Sine Wave

The abstract flower-like patterns in Figures 2a and 2b are the first to use a

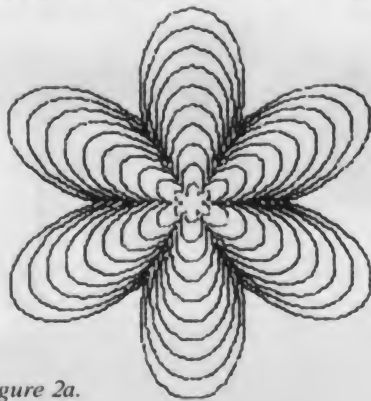


Figure 2a.

trigonometric function. In this case the radius of all the points is determined with a sine wave. As the radius increases or decreases as determined by the sine wave, the angle from the center is constantly being increased. The actual X and Y coordinates of the points to be plotted are determined as follows if AN is the angle from the center:

$$X = \cos(AN) * \text{RADIUS}; Y = \sin(AN) * \text{RADIUS}$$

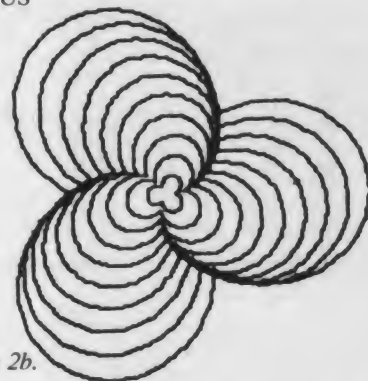


Figure 2b.

The complete pattern in Figure 2a is made by repeatedly drawing the same pattern and multiplying the radius by a constant each time to make each pattern larger than the one before. Figure 2b is much the same as Figure 2a except that it only has three petals and each successively larger pattern is twisted slightly with respect to the one before it.

Figure 3 also makes use of the sine function. In this case it gives the resulting figure something of a three-dimensional



Figure 3a.

look. The basic pattern used to make Figure 3c is shown in Figure 3a. This figure is then spun around from 0 to 180 degrees (0 to 3.14 radians) in steps of ten degrees. This is exactly what Figure 3b is.

Notice that the Y coordinates remain exactly the same. The X coordinate is multiplied by the cosine of the angle to give the X coordinate that is plotted. The result of this is that it looks almost as if the object is coming out toward you.

The completed pattern depicted in

IF YOUR WORD PROCESSOR IS SO
POWERFUL AND "SMART", WHY DOES
IT REQUIRE EXTRA MEMORY AND
RUN UNDER JUST ONE VERSION
OF DOS?

QUIT BITCHIN'!

michael shrayer's

Electric Pencil PCTM

word processing system

... is the SMARTEST and most
POWERFUL word processor
ever developed for the
IBM PC/XT—because it runs
under DOS 1.0, 1.1 and 2.0,
WITHOUT MODIFICATION! It
also runs with as little as 48K all
the way up to 512K—on hard disk
too! ELECTRIC PENCIL PC is
the only word processing system
that takes advantage of EVERY
hardware feature of the
IBM PC/XT. Don't be fooled by
competitors who can't record
history, we have already done it!
Take a look at history for
yourself and ask for your dealer
demonstration disk today.
It's only \$49.95. Call us
at (714) 946-5805.

Electric Pencil PC:

*The FIRST Best Seller will now
be the BEST Best Seller!*



Order from your favorite distributor or order direct.

IJG, Inc., 1953 West 11th St., Upland, CA 91786 (714)946-5805

* IBM is a registered trademark of International Business Machines Corp.

** Electric Pencil PC is a trademark of IJG, Inc.

michael shrayer's

Electric Pencil PCTM

word processing system

for the

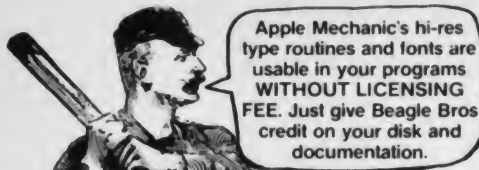
IBM[®]

IBM PC, IBM XT and all IBM
compatible computers

easy to learn
easy to use



CIRCLE 136 ON READER SERVICE CARD



APPLE MECHANIC

HI-RES SHAPE EDITOR / TYPE FONT DISK
by BERT KERSEY

\$29.50 Includes Peeks/Pokes Chart & Tip Book #5.

SHAPE EDITOR: Keyboard-draw hi-res shapes for animation in your Applesoft programs. Access & create **proportionally-spaced hi-res Typefaces** with each character re-definable as you want. Six fonts are included on the disk. Excellent LISTable Applesoft demos show you how to animate graphics and create professional-looking Charts and Graphs.

BYTE-ZAP: Rewrite any byte on a disk for repair or alteration. Load entire sectors on the screen for inspection. **Hex/Dec/Ascii displays** and input. Educational experiments included for making trick file names, restoring deleted files, changing DOS, etc.

MORE: Useful music, text and hi-res tricks for your programs. Clear educational documentation.

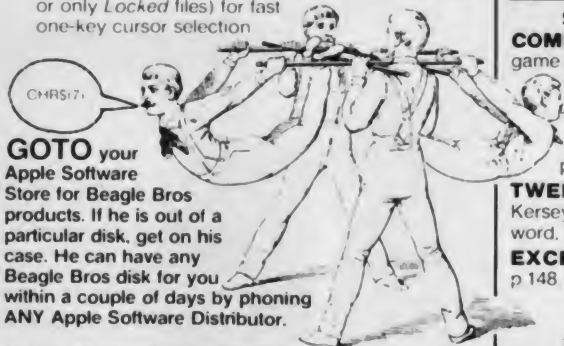
APPLE MECHANIC TYPEFACES

by BERT KERSEY

\$20.00 Includes Peeks & Pokes Chart.

26 NEW FONTS for use with Apple Mechanic programs. Many different sizes and styles, both ordinary and **Artistic**. Every character—from A to Z to “*” to “□”—of every typeface—from “Ace” to “Zooloo”—is re-definable to suit your needs. All typefaces are **proportionally spaced** for a more professional appearance. People do notice the difference!

BEAGLE MENU: Display only the file names you want from your disks (for example, only Applesoft or only Locked files) for fast one-key cursor selection.



RUSH the following disks by First Class Mail—

- | | | | |
|-----------------------------------------------|---------|-------------------------------------------------|---------|
| <input type="checkbox"/> Alpha Plot | \$39.50 | <input type="checkbox"/> Frame-Up | \$29.50 |
| <input type="checkbox"/> Apple Mechanic | 29.50 | <input type="checkbox"/> GPLE | 49.95 |
| <input type="checkbox"/> A M Typefaces | 20.00 | <input type="checkbox"/> ProntoDOS | 29.50 |
| <input type="checkbox"/> Beagle Bag | 29.50 | <input type="checkbox"/> Silicon Salad | 24.95 |
| <input type="checkbox"/> Beagle BASIC | 34.95 | <input type="checkbox"/> Tip Disk #1 | 20.00 |
| <input type="checkbox"/> DiskQuik | 29.50 | <input type="checkbox"/> Utility City | 29.50 |
| <input type="checkbox"/> DOS Boss | 24.00 | <input type="checkbox"/> | |
| <input type="checkbox"/> Double-Take | 34.95 | <input type="checkbox"/> ADD ME to mailing list | |
| <input type="checkbox"/> Flex Type | 29.50 | <input type="checkbox"/> ALREADY ON mail list | |

AT YOUR APPLE DEALER NOW!
Or order directly from Beagle Bros—



Visa MasterCard or COD. call **TOLL-FREE**

Orders only / ALL 50 STATES / 24 Hours a Day
1-800-227-3800 ext. 1607

OR mail U.S. Check, Money-Order or Visa MC#
to **BEAGLE BROS.**, 8th Floor
4315 SIERRA VISTA, SAN DIEGO, CA 92103

Attn: \$1.50 First Class Shipping. Any Sub. Order
Overseas add \$4.00. COD (add \$1.00 California add fee)
ALL ORDERS SHIPPED IMMEDIATELY

DOS BOSS

DISK COMMAND EDITOR
by BERT KERSEY and JACK CASSIDY

NEW!

\$24.00. Includes Peeks/Pokes Chart & Tip Book #2.

RENAME DOS COMMANDS & Error Messages—“Catalog” can be “Cat”; “Syntax Error” can be “Oops” or almost anything you want it to be.

PROTECT YOUR PROGRAMS. An unauthorized Save-attempt can produce a “Not Copyable” message, or any message you want. Also easy List-Prevention and other useful Apple tips and tricks. Plus one-key program-execution from catalog.

CUSTOMIZE DOS. Change the catalog Disk Volume heading to your message or title. Omit or alter catalog file codes. Fascinating documentation, tips and educational Apple experiments.

ANYONE USING YOUR DISKS (booted or not) will be using DOS the way YOU designed it.



10 LIST: LIST: LIST: FOR ZZ PEEK(175)+PEEK
(176)*256+36 TO 3072: POKE ZZ.216: NEXT
20 FOR XXX 1 TO 2: POKE-16299.0: POKE
-16300.0: XXX 1: NEXT: REM Experiment
with different length variable names.

BEAGLE BAG

12 APPLE GAMES ON ONE DISK
by BERT KERSEY

\$29.50 Includes Peeks & Pokes Chart
COMPARE BEAGLE BAG with any single-game Locked-Up disk on the market today.

All 12 games are a blast, the price is a bargain, the instructions are crystal clear, and the disk is **COPYABLE**. You can even change the programs or list them to learn programming tricks by seeing how they work.

TWELVE GAMES from the Applesoft Ace, Bert Kersey—TextTrain, Wowzo, Magic Pack, Buzzword, Slippery Digits, and many many more.

EXCELLENT REVIEWS—See Jan-83 *Softalk*, p 148. Beagle Menu too: see Typefaces description.



Beagle Bros
Micro Software Inc.

4315 SIERRA VISTA / SAN DIEGO, CA 92103
619-296-6400

**ALL BEAGLE DISKS ARE
UNLOCKED, COPYABLE
AND COMPATIBLE WITH
APPLE II, II+ AND IIe.*
(Don't Settle for Less!)**

*DISKQUIK requires Apple IIe
“APPLE” is a Registered Trade Mark of You-Know-Who

SILICON SALAD

INCLUDING TIP DISK #2
by BERT KERSEY and MARK SIMONSEN

\$24.95: Includes Peeks/Pokes AND Commands Charts.

MANY MINI-UTILITIES: Disk Scanner finds bad disk sectors. **Key-Clicker** adds subtle sound as you type. **DOS-Killer** adds two tracks of space to your disks. **2-Track Cat** allows up to 210 file names per disk. **Program Splitter** makes room for hi-res pix with large Applesoft programs. **Text Impprinter** transfers text to the hi-res screen. **Oner Tell Me** prints the appropriate error message but continues program execution. **Text Screen Formatter** converts text layouts into Print statements—plus much more Apple wizardry from the boys at Beagle Bros.

MORE TIPS ON DISK: Including fantastic programming tricks from Beagle Bros Tip Books 5, 6 and 7, plus programs from Tips/Tricks Chart #1.

TWO-LINERS TOO: From our customers around the world—and elsewhere. Little mind-blowers that will teach your old Apple some new tricks!

TIP DISK #1

100 TIP BOOK TIPS ON DISK
by BERT KERSEY

\$20.00 Includes Peeks & Pokes Chart.

100 LISTABLE PROGRAMS from Beagle Bros Tip Books 1-4. Make your Apple do things it's never done! All 100 programs are LISTable and changeable for Apple experimentation.

COMMAND CHART INCLUDED: Free with each Tip Disk, an 11 x 17 poster of all Applesoft, Integer Basic & DOS Commands with Descriptions!



FLEX TYPE

(FORMERLY “FLEX TEXT”)
VARIABLE-WIDTH HI-RES TEXT UTILITY
by MARK SIMONSEN

\$29.50 Includes Peeks & Pokes Chart

PRINT VARIABLE-WIDTH TEXT on both hi-res screens with normal Applesoft commands (including HTAB 1-70). Normal, expanded & compressed text with no extra hardware (70-column text requires a monochrome monitor, not a tv).

ADD GRAPHICS TO TEXT or add Text to hi-res graphics. Run your existing Applesoft programs under Flex Type control. Fast, easy to use, and Compatible with GPLE and Double-Take.

DOS TOOL KIT* font compatibility, or use the supplied Flex Type typefaces. Select up to 9 fonts with control-key commands. A text character editor lets you redesign any Apple text character.

FRAME-UP

FAST APPLE DISPLAY UTILITY
by TOM WEISHAAR

\$29.50 Includes Peeks & Pokes Chart

PROFESSIONAL PRESENTATIONS: Turn your existing Hi-Res, Lo-Res and Text frames into attractive Apple “slide shows.” **FAST** hi-res loads in 2 -seconds! Paddle or Keyboard-advance frames.

UNATTENDED SHOWS are optional, with each picture arranged and pre-programmed to display on the screen from 1 to 99 seconds. Custom **Text Screen Editor** lets you create black-and-white text “slides” and add type “live” from the keyboard during shows. Mail copies of presentations on disk to your friends and associates (or home to Mom!)

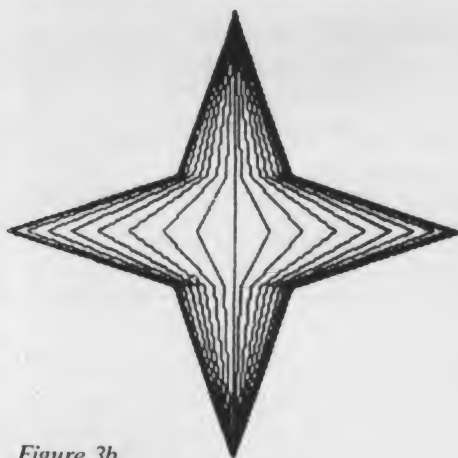


Figure 3b.

Figure 3c is made from two copies of Figure 3b placed at 90 degrees to each other. This is done easily enough by switching the X and Y coordinates when drawing the second copy. Again, a relatively complex figure is made from a simple pattern that is repeated.

Sphere

The next drawing, Figure 4, employs the same type of construction technique as the previous figure. This time the starting figure is a semicircle instead of the pointed outline in Figure 3a. The math used to draw it is also exactly the same as in the last figure. This time, however, the points along the starting figure, namely the semicircle, are calculated instead of being given

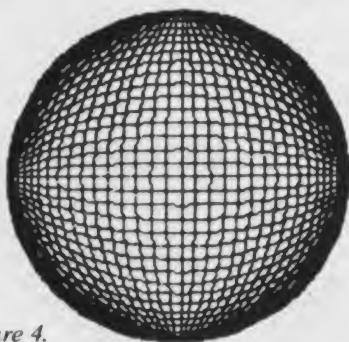


Figure 4.

by an array as done previously.

The points along the semicircle are calculated at five-degree intervals to approximate a real semicircle. The resulting figure has a more three-dimensional appearance than Figure 3c because we can all recognize Figure 4 as a sphere or a ball.

Three-Dimensions

The complexities of drawing objects in three dimensions first become apparent in Figure 5. In reality, the way it is drawn is similar to the way the sphere was drawn. Instead of a semicircle, the pattern in Figure 5a is spun on its axis to create the three-dimensional object.

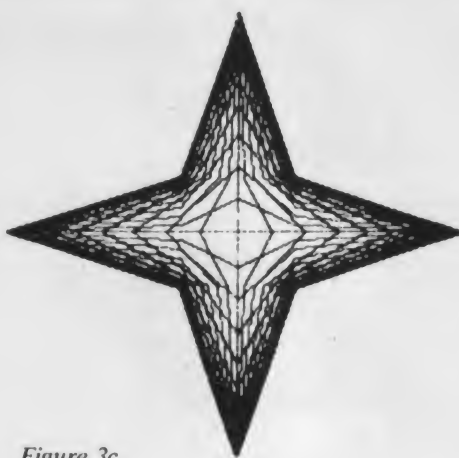


Figure 3c.

Instead of just rotating it through 180 degrees, however, it is spun through a complete 360 degrees (2π in radians). This has both its advantages and disadvantages. The advantage is that the object will look truly three-dimensional when it is tilted at an angle so that the whole top surface becomes visible. The disadvantage is that all the lines you can't see in reality (hidden lines) must be removed somehow.

The first problem is to tilt the object so that the top surface can be seen. This requires you to begin to think in terms of three dimensions. Each point on the object has an X, Y and Z coordinate. Think of the X and Y coordinates as being the same as on any graph, while the Z coordinate is a measure of the depth into the paper or distance above the paper. Now if the object is tilted up as in Figures 5c, 5d, and 5e, the X coordinate always remains the same for a given point on the object. All that remains is to find the Y coordinate

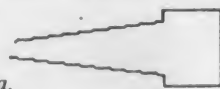


Figure 5a.

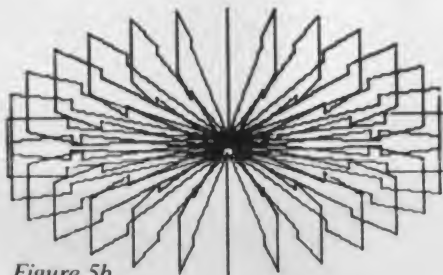


Figure 5b.

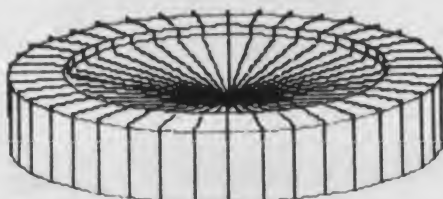


Figure 5c.

to be plotted because this will change depending on the depth, or Z coordinate.

To do this, the first thing we must do is calculate the angle of the point with respect to the center. This angle is given by $\text{ATN}(Y/Z)$. The distance from the X axis, which will become the radius when the object is tilted around the X axis, should also be known. The distance is given by $\text{SQR}(Y^2 + Z^2)$.

Finally, to actually tilt the object a certain number of degrees, for example 30 degrees, simply add 30 degrees to the angle that was just calculated. The new Y coordinate of the point will be equal to $\text{SIN}(\text{ANGLE}) \cdot \text{RADIUS}$. In reality the Z coordinate will also change when the object is tilted, but this will not change the two-dimensional view that is plotted.

Now all that remains to be done is to remove the hidden lines. First, the bottom cannot be seen so those lines can simply be deleted. Secondly, the lines representing the sides cannot be seen on the far side of the object, so they can also be deleted from the drawing.

The last remaining hidden lines are those that might be hidden because of the inside edge which is facing out of the paper (see Figure 5c). These can be removed by calculating the angle between the point to be plotted and the corresponding point on the inside edge. If this angle is greater than the angle of tilt, then the point will not be plotted. (For more on hidden line removal, see "Hidden Surface Elimination" in this issue. —Ed.)

The objects in Figures 5c, 5d, and 5e all take a while to plot, so go do something else for ten minutes. Also try tilting the objects at different angles. Figure 5c is tilted at 17 degrees, 5d at 35 degrees; and 5e at 50 degrees. They are all done with 40 steps.

Figure 6 is what is commonly referred

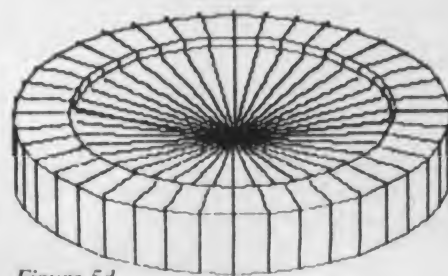


Figure 5d.

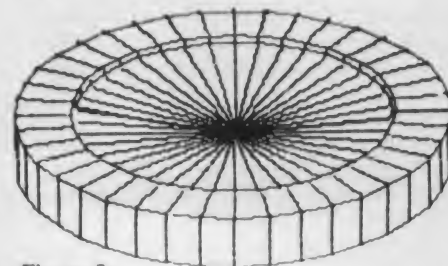


Figure 5e.

Plotter Tutorial, continued...

to as a torus. It is made in exactly the same way as Figure 5. The outline that is spun on its axis is shown in Figure 6a. The only difference that exists in plotting the two figures is that the hidden lines along the outside edge are more difficult to remove because the edges are round rather than square. The angle between

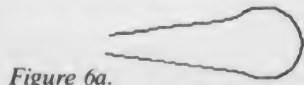


Figure 6a.

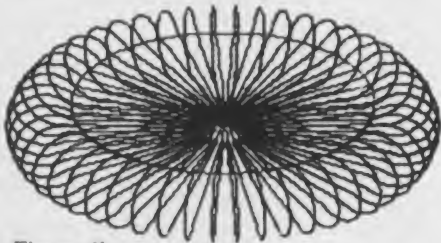


Figure 6b.

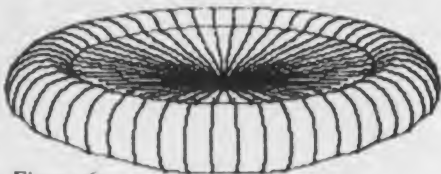


Figure 6c.

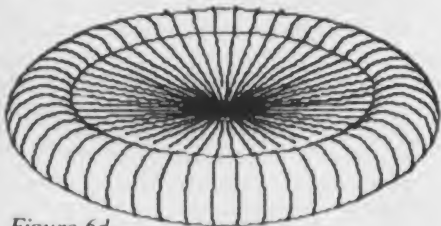


Figure 6d.

the point to be plotted and the edge possibly blocking the view must be calculated. If it is greater than the angle of tilt, the point will not be drawn.

Using A Grid

A much different approach to plotting in three dimensions is shown in Figures 7a and 7b. Instead of having only the actual object drawn, the object is shown as a projection from a flat plane. The procedure for plotting the points is exactly the same as for Figures 5 and 6. The important difference lies in that the points that are to be plotted lie along a grid while with the torus the points to be plotted lie along the radius of the object. Both approaches result in a three dimensional effect.

Removing the hidden lines is a fairly involved procedure once again. The highest points along the half-sphere lie along a line that is at an angle of 30 degrees to the X axis or where $Z=0$. If the angle between the point to be plotted and the corresponding point in the same line of

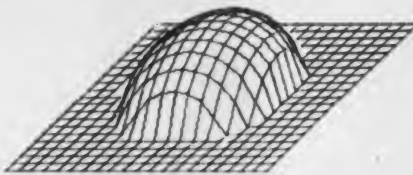


Figure 7a.

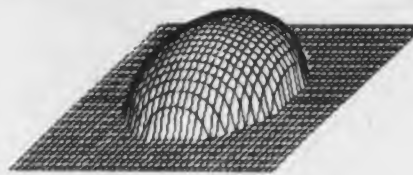


Figure 7b.

sight on the sphere is greater than the angle of tilt then the point will not be plotted. I won't go into detail on the trigonometry here because it is only applicable to the drawing of this half-sphere.

There is one more point that should be made about the half spheres in Figure 7. Figure 7b looks much more like a half sphere than Figure 7a. Obviously, this is because the grid is much finer in Figure 7b. The grid is twice as fine in both the X and Z dimensions, which makes for an overall resolution that is four times better. Unfortunately, this means it also takes four times as long to draw. I recommend the finer resolution, a step size of five, if you have the time. The step size is given by ST in line 20.

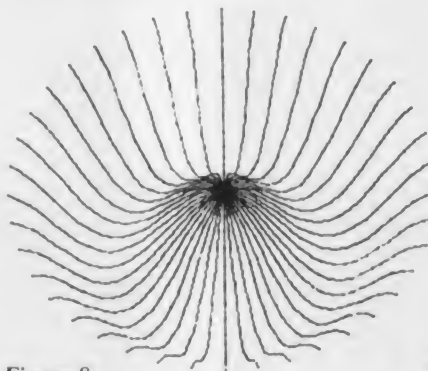


Figure 8.

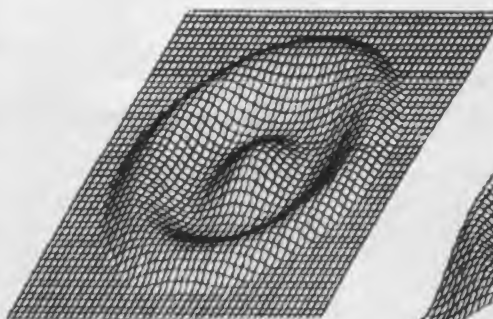


Figure 9b.

Figures 8 and 9 have been included to contrast the grid method and the radii method. The points in Figure 8 are located along radius spaced at given angles while those in Figure 9 are located along a grid. Both Figures 8 and 9 show the same figure, namely a cosine wave from 0 to 2π that is spun about to create a three-dimensional object.

The grid projection in Figure 9a still does not have the hidden lines removed. To take out the hidden lines in this figure would take far too many calculations and too much time. So instead of removing the hidden lines, I tilted the plane from the original 50 degrees in Figure 9a to 63 degrees in Figure 9b. VT in line 30 represents the angle of tilt of the plane. This way there are no hidden lines and the three dimensions are still retained.

Figure 9c is the same cosine wave used in Figures 9a and 9b, but the wave is not stopped at 2π . Instead it is continued to the corners of the grid, making for a most impressive design.

The program in Listing 9 will plot Figure 9b as is. To plot Figure 9c, delete the rest of lines 70 and 160 after the first statement. The figures as shown were plotted with a step size of five, but a step size of ten will still allow reasonable resolution while taking only one quarter of the amount of time.

I hope I have been able to pass on some valuable insights into the techniques used to draw various graphic patterns and three-dimensional figures. Simply polish up on your trigonometry, use your ingenuity, and experiment a lot. Impressive graphics are difficult to make, but are definitely not beyond your reach.

Listings 1-9 on following pages.

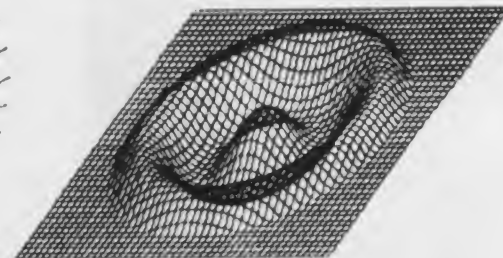


Figure 9a.

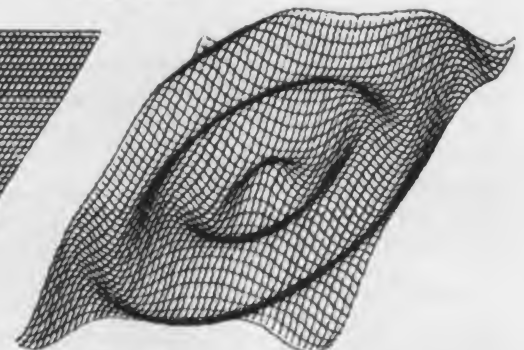


Figure 9c.

Listing 1a.

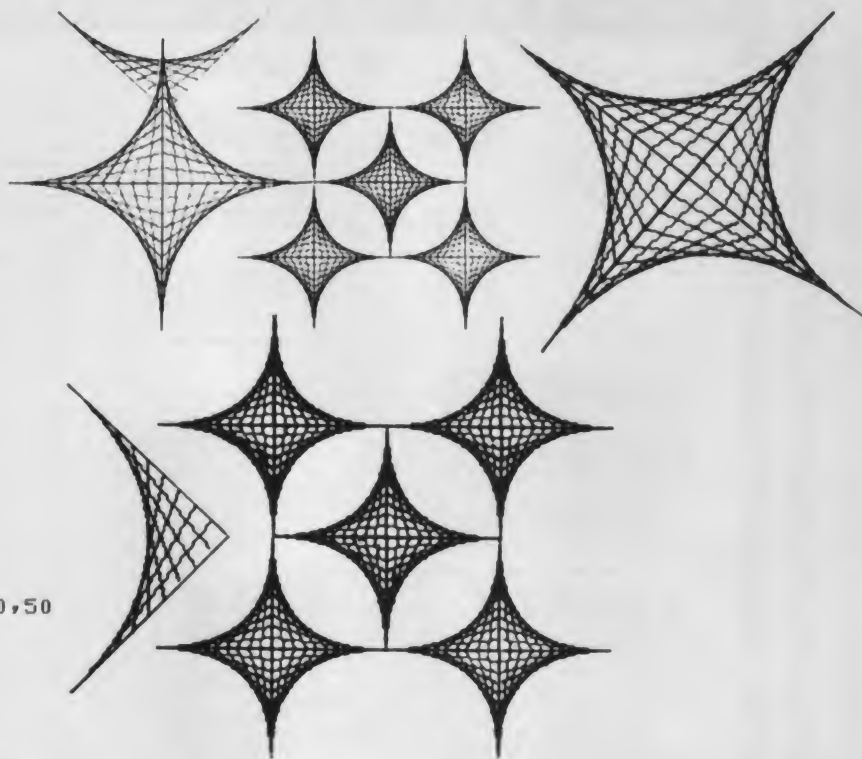
```
20 FORX1=0 TO 100 STEP 10
30 Y1=100-X1
40 X=0:Y=Y1:A$="MOVE":GOSUB1000
50 X=X1:Y=0:A$="DRAW":GOSUB1000
60 NEXTX1
70 END
```

Listing 1b.

```
20 FOR C=1T04
30 FOR X2=0 TO 100 STEP 10
40 Y=100-X2:X1=X2
50 IFC=2THENY=-Y
60 IFC=3THENY=-Y:X1=-X2
70 IFC=4THENX1=-X2
80 X=0:A$="MOVE":GOSUB1000
90 X=X1:Y=0:A$="DRAW":GOSUB1000
100 NEXT X2
110 NEXTC
120 END
```

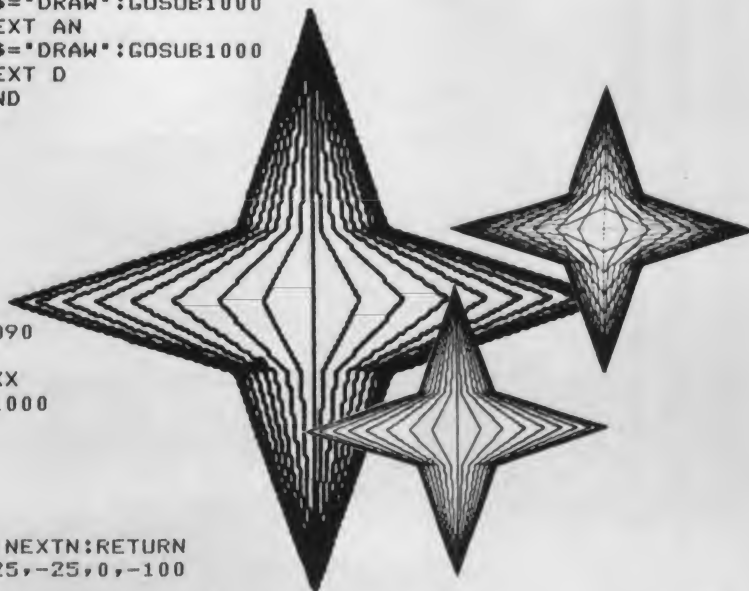
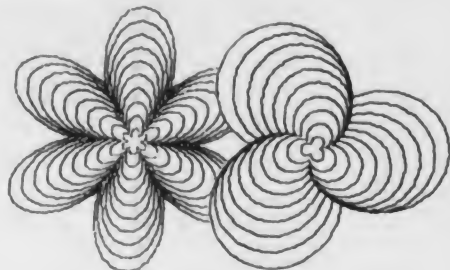
Listing 1c.

```
20 FOR N=1T05:READ X,Y
30 CX=X:CY=Y:GOSUB70
40 NEXTN
50 END
60 DATA 0,0,-50,-50,50,-50,-50,50,50,50
70 FOR C=1T04
80 FOR X2=0 TO 50 STEP 5
90 Y=50-X2:X1=X2
100 IFC=2THENY=-Y
110 IFC=3THENY=-Y:X1=-X2
120 IFC=4THENX1=-X2
130 A$="MOVE":X=CX:Y=CY+Y:GOSUB1000
140 A$="DRAW":X=CX+X1:Y=CY:GOSUB1000
150 NEXTX2
160 NEXTC:RETURN
```



Listing 2.

```
5 INPUT"NUMBER OF 'LEAVES'=";P:P=P/2
10 INPUT"SLOWLY TWISTING (Y/N)";B$:B$=LEFT$(B$,1)
20 PI=3.1415:P2=2*PI
30 S=P2/180:N1=5:N2=4
40 FOR D=1 TO 10
50 M1=N1*D:M2=N2*D:IFB$="Y"THENAA=D*PI/30
60 FOR AN=0 TO P2 STEP S:A=AN+AA
70 SN=ABS(SIN(AN*P)):RA=SN*M1+M2
80 X=COS(A)*RA:Y=SIN(A)*RA
90 IF AN=0 THEN A$="MOVE":GOSUB1000 :X1=X:Y1=Y:GOTO120
100 X=INT(X):Y=INT(Y)
110 A$="DRAW":GOSUB1000
120 NEXT AN
130 A$="DRAW":GOSUB1000
140 NEXT D
150 END
```



Listing 3.

```
10 PI=3.1415926:P2=PI*2
20 S=PI/20
30 GOSUB160
40 FORAN=0T0PI STEP S
50 FOR N=1T05
60 X=X(N)*COS(AN):Y=Y(N)
70 IFN=1 THEN A$="MOVE":GOTO90
80 A$="DRAW"
90 IF F1=1 THEN XX=X:X=Y:Y=XX
100 X=INT(X):Y=INT(Y):GOSUB1000
110 NEXTN
120 NEXT AN
130 IFF1=1THEN150
140 F1=1:GOTO40
150 END
160 FORN=1T05:READX(N),Y(N):NEXTN:RETURN
170 DATA 0,100,25,25,100,0,25,-25,0,-100
```



COMPUTER MAIL ORDER

TERMINALS

910	\$519.00
910 Plus	\$599.00
914	\$569.00
924	\$689.00
925	\$739.00
950	\$929.00
970	\$1039.00

COMPUTERS

Teleport Portable	CALL
800A	\$1099.00
802	\$2699.00
803	\$1949.00
802H	\$4695.00
806/20	\$4999.00
816/40	\$9199.00
1602	\$3399.00
1603	CALL



SANYO

MBC-550 PC	CALL
MBC-555 PC	CALL
MBC 1100	\$1599.00
MBC 1150	\$2099.00
MBC 1200	\$1999.00
MBC 1250	\$2399.00
FDD 3200-320K Drive	\$399.00
FDD 6400-64K Drive	\$499.00
PR 5500 Printer	\$699.00

MONITORS

AMDEK

300 Green	\$149.00
300 Amber	\$159.00
310 Amber	\$169.00
Color 1	\$279.00
Color 1 Plus	\$299.00
Color 2	\$399.00
Color 2 Plus	\$419.00
Color 3	\$349.00
Color 4	\$699.00

BMC

12" Green	\$79.99
12" Green HI-RES	\$119.99
9191-13" Color	\$249.99

GORILLA

12" Green	\$88.99
12" Amber	\$95.99

NEC

JB 1260 Green	\$109.99
JB 1201 Green	\$149.99
JB 1205 Amber	\$159.99
JC 1215 Color	\$299.99
JC 1216 RGB	\$429.99

QUADRAM

Quadchrome	\$499.99
------------	----------

TAXAN

12" Green	\$119.00
12" Amber	\$129.00
Taxan 1 RGB	\$279.00

USI

Pi 1.9" Green	\$99.99
Pi 2.12" Green	\$119.99
Pi 3.12" Amber	\$149.99
Pi 4.9" Amber	\$139.99
1400 Color	\$269.99

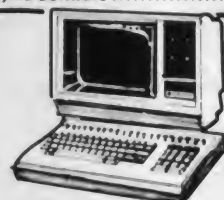
ZENITH

ZVM 122 Amber	\$99.99
ZVM 123 Green	\$89.99
ZVM 135 Color/RGB	\$469.99

TeleVideo



Spirit XL Portable	\$3999.00
II-E-1	\$1369.00
II-E-2	\$1649.00
II-E-3	\$2399.00
II-E-4	\$3199.00
PC-E	\$1579.00
PC-1	\$2399.00
PC-2	\$2799.00
PC-XL	\$3599.00
1620	\$3599.00
1630	\$5499.00
1640	\$6499.00
Cyma Software	CALL



MODEMS

ANCHOR

Mark I (RS-232)	\$79.00
Mark II (Atari)	\$79.00
Mark III (TI-99)	\$109.00
Mark IV (CBM/PET)	\$125.00
Mark V (Osborne)	\$95.00
Mark VI (IBM-PC)	\$169.00
Mark VII (Auto Ans/Auto Dial)	\$119.00
Mark XII (1200 Baud)	\$299.00
TRS-80 Color Computer	\$99.00
9 Volt Power Supply	\$9.00

HAYES

Smartmodem 300	\$219.00
Smartmodem 1200	\$509.00
Smartmodem 1200B	\$459.00
Micromodem II	\$265.00
Micromodem II Plus	\$299.00
Micromodem IIE	\$269.00
Micromodem 100	\$299.00
Smart Com II	\$89.00
Chronograph	\$199.00

NOVATION

J-Cat	\$99.99
SmartCat 103	\$179.00
SmartCat 103/212	\$399.00
AutoCat	\$219.00
212 AutoCat	\$549.00
Apple Cat II	\$249.00
212 Apple Cat	\$569.00
Apple Cat 212 Upgrade	\$309.00
Cat	\$139.99
D-Cat	\$149.00
PC-Cat	\$339.00

ZENITH

ZT-1	\$369.00
------	----------

APPLE INTERFACE

Choose from PKASO, Orange Micro, MPC, MicroMax, Tymac, Quadram & Practical Peripherals	CALL
----------------------------------------------------------------------------------------	------

IBM

NEC 3550.....\$1699.00 PERCOM/TANDON DRIVES

5 1/4" 320K Floppy	\$249.00
5 Meg Hard w/Controller	\$1399.00
10 Meg Hard w/Controller	\$1699.00
15 Meg Hard w/Controller	\$2095.00
20 Meg Hard w/Controller	\$2399.00

AMDEK

310A Amber Monitor	\$169.00
DX1 100 Plotter	\$599.00
Color II	\$399.00

AST RESEARCH, INC.

Six Pak Plus...from	\$279.00
Combo Plus II...from	\$279.00
Mega Plus...from	\$309.00
I/O Plus II...from	\$139.00

QUADRAM

Quadlink	\$549.00
Quadboard...as low as	\$289.00
Quad 512 Plus...as low as	\$249.00
Quadcolor...as low as	\$219.00
Chronograph	\$89.00
Parallel Interface Board	\$89.00
64K RAM Chips Kit	\$59.00

MICRO PRO

WordStar/Mail Merge	\$369.00
InfoStar	\$299.00
SpellStar	\$159.00
CalcStar	\$99.00

MICROSTUF

Crosstalk	\$105.00
-----------	----------

MICROSOFT

Multiplan	\$159.00
-----------	----------

pfs

	APPLE	IBM
Write:	79.00	89.00
Graph:	79.00	89.00
Report:	79.00	79.00
File:	79.00	89.00
Solutions*: as low as	16.00	16.00

*Call On Titles

PRINTERS

NEC

8023 Dot Matrix	\$379.00
8025 Dot Matrix	\$669.00
2050 Letter Quality	\$999.00
3510 Serial/Letter Quality	\$1449.00
3530 Parallel/Letter Quality	\$1499.00
3550 IBM/Letter Quality	\$1699.00
7710/7730 Serial/Parallel	\$1949.00

OKIDATA

82.83.84.92.93.2350.2410	CALL
--------------------------	------

SMITH CORONA

TP-2	\$449.00
Tractor Feed	\$119.00

SILVER REED

500 Letter Quality	\$469.00
550 Letter Quality	\$699.00

STAR

Gemini 10X	\$299.00
Gemini P15	\$449.00
Delta 10	\$559.00
Serial Board	\$75.00

TOSHIBA.....CALL

TRANSTAR.....CALL

PRINTER CABLES

Available for Atari, Commodore, IBM, Apple, Epson, Kaypro, Teledore, Franklin, Eagle, Sanyo, Osborne, NEC, Zenith and many others. We supply all your computer needs!

PAPER SUPPLIES

1000 sheets, 8 1/2 x 11 Tractor Paper	\$19.99
1000 sheets, 14 1/2 x 11 Tractor Paper	\$24.99
1 or 2" Address Labels	\$9.99

=WEST= =CANADA= =EAST=
800.648.3311 800.268.4559 800.233.8950



In NV call (702)588-5654, Dept. 0208
 Order Status Number: 588-5654
 P.O. Box 6689, Staterline, NV 89449

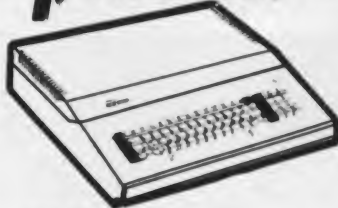
In Toronto call (416)828-0866, Dept. 0208
 Order Status Number: 828-0866
 2505 Dunwin Drive, Unit 18
 Mississauga, Ontario, Canada L5L1T1

In PA call (717)327-9575, Dept. 0208
 Order Status Number: 327-9576
 Customer Service Number: 327-1450
 477 E. Third St., Williamsport, PA 17701

No r/s, no deposit on C.O.D. orders. Pre-paid orders receive free shipping within the UPS continental United States with no waiting period for certified checks or money orders. Add 3% (minimum \$5.00) shipping and handling on all C.O.D. and credit card orders. Larger shipments may require additional charges. NV and PA residents add sales tax. All items subject to availability and price change. We stock manufacturer's and third party software for most all computers on the market. Call today for our catalog.

COMPUTER MAIL ORDER

FRANKLIN



APPLE/FRANKLIN DISK DRIVES MICRO-SCI

A2	\$219.00
A40	\$299.00
A70	\$319.00
C2 Controller	\$79.00
C47 Controller	\$89.00

RANA

Elite 1	\$279.00
Elite 2	\$389.00
Elite 3	\$569.00

APPLE IIe STARTER PACK
64K Apple IIe, Disk Drive & Controller,
80 Column Card, Monitor II & DOS 3.3
COMPLETE \$1499.00



HOME COMPUTERS



600XL.....\$189
800XL.....\$299

1200XL CALL
1400XL CALL

commodore

**CBM
8032**

\$599

CBM 64\$199
VIC 20CALL



C1541 Disk Drive	\$249.00
C1530 Datasette	\$69.00
C1520 Color Printer/Plotter	\$169.00
C1525 Dot Matrix/Parallel	\$219.00
C1526 Dot Matrix/Serial	\$279.00
C1702 Color Monitor	\$249.00
C1311 Joystick	\$4.99
C1312 Paddles	\$11.99
C1600 VIC Modem	\$89.00
C1650 Auto Modem	\$89.00
Logo 64	\$49.00
Pilot 64	\$39.00
Simon's Basic	\$19.00
Word Pro 64 Plus	\$59.00
Parallel Printer Interface	\$69.00
Calc Result 64	\$129.00
Codewriter 64	\$75.00
Quick Brown Fox	\$49.00
Word Pro 64 Plus	\$59.00

PROFESSIONAL SOFTWARE

Word Pro 2 Plus	\$159.00
Word Pro 3 Plus	\$189.00
Word Pro 4 Plus/5 Plus, each	\$279.00
InfoPro	\$179.00
Administrator	\$399.00
Power	\$79.00

We stock a full inventory of software for Commodore, such as:
Artworx, Broderbund, Commercial Data, Creative Software,
Epyx, HES, MicroSpec, Nufekop, Romox, Sirius, Synapse,
Thorn EMI, Tronix, UMI, Victory, Spinnaker, Rainbow & Timeworks!
CALL FOR DETAILS!

HANDHELD COMPUTERS



41CV	\$209
41CX	\$259
HP 10C	\$51.99
HP 11C	\$69.99
HP 12C	\$88.99
HP 15C	\$88.99
HP 16C	\$88.99
HP 75C	\$749.99
HPIL Module	\$98.99
HPIL Cass. or Printer	\$359.99
Card Reader	\$143.99
Extended Function Module	\$63.99
Time Module	\$63.99

NEC

PC-8201 Personal Computer	\$599.00
PC-8221A Thermal Printer	\$149.00
PC-8281A Data Recorder	\$99.00
PC-8201-06 8K RAM Chips	\$105.00
PC-8206A 32K RAM Cartridge	\$329.00

PC-1500A...\$165.99
PC-1250A...\$88.99

CE-125 Printer/Cassette	\$128.99
CE-150 Color Printer/Cassette	\$171.99
CE-155 8K RAM	\$93.99
CE 161 16K RAM	\$134.99
CE 500 ROM Library	\$29.99

TIMEX/SINCLAIR 1000

Timex/Sinclair 1000	\$35.99
16K Memory	\$29.99
2040 Printer	\$99.99
VuCalc	\$17.99
Mindware Printer	\$99.99

1010 Recorder	\$74.00
1020 Color Printer	\$249.00
1025 Dot Matrix Printer	\$449.00
1027 Letter Quality	\$299.00
1030 Direct Connect Modem	CALL
1050 Disk Drive	\$379.00
CX30 Paddle	\$12.00
CX40 Joystick	each \$8.00
CX77 Touch Tablet	\$64.00
CX80 Trak Ball	\$48.00
CX85 Keypad	\$105.00
4003 Assorted Education	\$47.00
4011 Star Raiders	\$33.00
4012 Missile Command	\$29.00
4013 Asteroids	\$29.00
5049 VisiCalc	\$159.00
7097 Logo	\$79.00
7101 Entertainer	\$69.00
7102 Arcade Champ	\$75.00
8026 Dig Dug	\$33.00
8030 E. T. Phone Home	\$33.00
8031 Donkey Kong	\$39.00
8036 Atari Writer	\$79.00
8040 Donkey Kong, Jr.	\$39.00
8043 Ms. PacMan	\$39.00
8044 Joust	\$39.00

DISKETTES MAXELL

5 1/4" MD-1	\$29.00
5 1/4" MD-2	\$39.00
8" FD-1 (SS/DD)	\$39.00
8" FD-2 (DS/DD)	\$49.00

VERBATIM

5 1/4" SS/DD	\$26.99
5 1/4" DS/DD	\$36.99

ELEPHANT

5 1/4" SS/SD	\$18.49
5 1/4" SS/DD	\$22.99
5 1/4" DS/DD	\$28.99

HEAD

5 1/4" Disk Head Cleaner	\$14.99
--------------------------	---------

DISK HOLDERS

INNOVATIVE CONCEPTS	
Flip-n-File 10	\$3.99
Flip-n-File 50	\$17.99
Flip-n-File (400/800ROM) Holder	\$17.99

LJK ENTERPRISES

Atari Letter Perfect-Disk (40/80)	\$79.99
Atari Letter Perfect-ROM (40 col)	\$79.99
Atari Letter Perfect-ROM (80 col)	\$79.99
Atari Data Perfect-ROM (80 col)	\$79.99
Atari Spell Perfect-DISK	\$59.99
Atari Utility/MailMerge	\$21.00
Apple Letter Perfect	\$99.00
Apple Data Perfect	\$75.00
Apple LJK Utility	\$21.00
Apple Lower Case Generator	\$19.00

PERCOM

AT 88-S1	\$329.00
AT 88-A2	\$259.00
AT 88-S2	\$529.00
AT 88-S1PD	\$429.00
AT 88-DDA	\$119.00
RFD 40-S1	\$449.00
RFD 40-A1	\$269.00
RFD 40-S2	\$699.00
RFD 44-S1	\$539.00
RFD 44-S2	\$869.00

TEXAS INSTRUMENTS

TX 99-S1	\$279.00
----------	----------

RANA

1000	\$319.00
------	----------

TRAK

AT-D2	\$389.00
-------	----------

MEMORY BOARDS

Axlon 32K	\$59.00
Axlon 48K	\$99.00
Axlon 128K	\$299.00
Intec 32K	\$59.00
Intec 48K	\$85.00
Intec 64K	\$99.00
Intec Real Time Clock	\$29.00

ALIEN VOICE BOX

Atari	\$119.00
Apple	\$149.00

KOALA PAD

Atari	\$75.00
Apple	\$85.00
IBM	\$95.00
CBM 64	\$75.00

CONTROLLERS & JOYSTICKS WICO

Joystick	\$21.99
3-way Joystick	\$22.99
Famous Red Ball	\$23.99
Power Grip	\$21.99
BOSS Joystick	\$17.99
ATARI/VIC Trak Ball	\$34.99
Apple Trak Ball	\$54.99
Apple Adapter	\$15.99
Apple Analog	\$37.99

KRAFT

Joystick	\$41.99
Atari Single Fire	\$12.99
Atari Switch Hitter	\$15.99
Apple Paddles	\$34.99
IBM Paddles	\$34.99
IBM Joystick	\$46.99

AMIGA

3100 Single	\$13.99
3101 Pair	\$19.99
Joystick	\$37.99

TG

Atari Trak Ball	\$47.99
Apple Joystick	\$47.99
Apple Trak Ball	\$47.99

=WEST= =CANADA= =EAST=
800.648.3311 800.268.4559 800.233.8950

In NV call (702) 588-5654, Dept. 0208
Order Status Number: 588-5654
P.O. Box 6689, Stateline, NV 89449

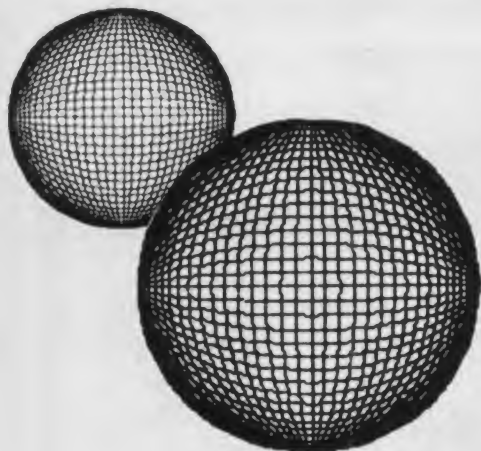
In Toronto call (416) 828-0866, Dept. 0208
Order Status Number: 828-0866
2505 Dunwin Drive, Unit 1B
Mississauga, Ontario, Canada L5L1T1

In PA call (717) 327-9575, Dept. 0208
Order Status Number: 327-9576
Customer Service Number: 327-1450
477 E. Third St. Williamsport, PA 1770

MasterCard

CANADIAN ORDERS: All prices are subject to shipping, tax and currency fluctuations. Call for exact pricing in Canada.
INTERNATIONAL ORDERS: All shipments outside the continental United States must be pre-paid by certified check only. Include 3% (minimum \$5.00) shipping and handling. EDUCATIONAL DISCOUNTS: Additional discounts are available to qualified Educational Institutions.
APO & FPO: Add 3% (minimum \$5.00) shipping and handling.

CIRCLE 110 ON READER SERVICE CARD



Listing 4.

```

10 PI=3.1415926:P2=PI*2
20 S=5*PI/180:RA=75
30 FOR B=0 TO PI STEP S
40 FOR A=0 TO PI STEP S
50 Y=SIN(A)*RA*COS(B):X=COS(A)*RA
60 IF A=0 THEN A$="MOVE":GOTO80
70 A$="DRAW"
80 X=INT(X):Y=INT(Y)
90 GOSUB1000
100 NEXT A
110 NEXT B
120 FOR B=0 TO PI STEP S
130 FOR A=0 TO PI STEP S
140 Y=COS(A)*RA:X=SIN(A)*RA*COS(B)
150 IFA=0 THEN A$="MOVE":GOTO170
160 A$="DRAW"
170 X=INT(X):Y=INT(Y)
180 GOSUB1000
190 NEXTA:NEXTE
200 END

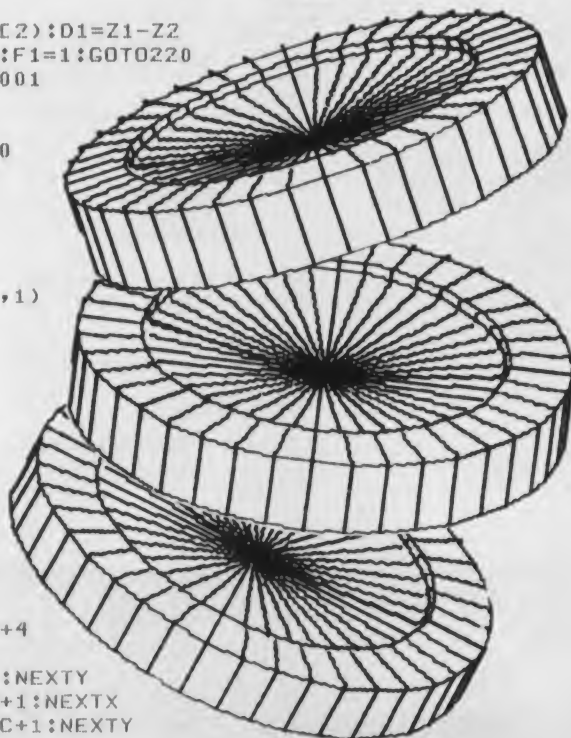
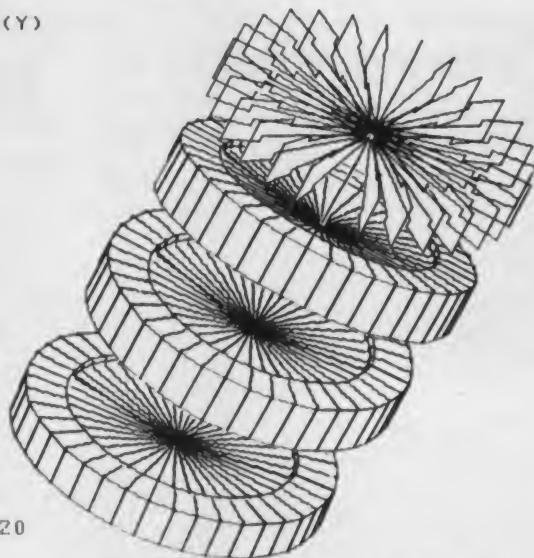
```

Listing 5.

```

10 DIM X(70),Y(70),EX(4,50),EY(4,50)
12 INPUT"NUMBER OF STEPS":ST:ST=ST/2
14 INPUT"ANGLE":A:GOSUB370
20 PI=3.1415:S=PI/ST:A=A*PI/180:A2=A*S2=2*ST+1:ST=ST+1
30 FOR Z=0 TO 2*PI STEP S:E=E+1
40 IF SW=1 THEN 60
50 IFZ>PI THEN A=-A:SW=1
60 GN=0:A$="MOVE":X=0:Y=0:GOSUB1000
70 FORN=1 TO C:IFGN=1 THEN 220
80 IFN<47 THEN 100
90 IF Z>0 AND Z<PI THEN GN=1:EX(4,E)=X:EY(4,E)=Y:GOTO220
100 IF N>41 THEN 140
110 IFSIN(Z)=0 THEN 140
120 Z1=SIN(Z)*X(N):Z2=COS(Z)*X(N):Z2=-SQR(80C2-Z2C2):D1=Z1-Z2
130 Y1=Y(N):Y2=20:IF ATN((Y2-Y1)/D1)>A2 THEN N=41:F1=1:GOTO220
140 Y=Y(N):Z1=X(N)*SIN(Z)*COS(A):IFZ1=0 THEN Z1=.0001
150 Z1=ABS(Z1):X=X(N)*COS(Z):D=SQR(Z1C2+Y2C2)
160 AN=ATN(Y/Z1)+A:Y=SIN(AN)*D:X=INT(X):Y=INT(Y)
170 IFF1<>0 THEN A$="MOVE":GOSUB1000:F1=0:GOTO190
180 A$="DRAW":GOSUB1000
190 IFN=46 THEN EX(3,E)=X:EY(3,E)=Y
200 IFN=39 THEN EX(1,E)=X:EY(1,E)=Y
210 IFN=42 THEN EX(2,E)=X:EY(2,E)=Y
220 NEXTN:IF GN=0 THEN EX(4,E)=X:EY(4,E)=Y
230 NEXTZ:S2=E:E=E+1:EX(4,E)=EX(4,1):EY(4,E)=EY(4,1)
240 A$="MOVE":X=EX(1,1):Y=EY(1,1):GOSUB1000
250 FORN=1 TO ST:X=EX(1,N):Y=EY(1,N)
260 A$="DRAW":GOSUB1000:NEXTN
270 X=EX(2,S2):Y=EY(2,S2):A$="MOVE":GOSUB1000
280 FORN=1 TO S2:X=EX(2,N):Y=EY(2,N)
290 A$="DRAW":GOSUB1000:NEXTN
300 A$="MOVE":X=EX(3,S2):Y=EY(3,S2):GOSUB1000
310 FORN=1 TO S2:X=EX(3,N):Y=EY(3,N)
320 A$="DRAW":GOSUB1000:NEXTN
330 A$="MOVE":X=EX(4,ST):Y=EY(4,ST):GOSUB1000
340 FORN=ST TO E:X=EX(4,N):Y=EY(4,N)
350 A$="DRAW":GOSUB1000:NEXTN
360 END
370 C=0:FORX=4 TO 80 STEP 2:C=C+1:X(C)=X:Y(C)=Y/8+4
380 NEXTX
390 X=80:FORY=16 TO 20 STEP 2:X(C)=X:Y(C)=Y:C=C+1:NEXTY
400 Y=20:FORX=82 TO 110 STEP 10:X(C)=X:Y(C)=Y:C=C+1:NEXTX
410 X=110:FORY=20 TO -20 STEP -2:X(C)=X:Y(C)=Y:C=C+1:NEXTY
420 C=C-1
430 RETURN

```



The END of DINKETY-DINK-DINK.

Announcing the first computer music program that actually sounds like music.

LET'S FACE IT. Up till now, music programs for your home computer have all sounded, well, pretty lame. There were the ones that resembled little electronic music boxes, remember? And then there were those that sounded like so many burps.

Enter Music Construction Set.™ It's the first music program that really makes use of the power of that machine you've got. If you're a serious student, this means you'll be able to work with an intricacy and range of sound quality you've never heard before on a computer. And if you know nothing about music, you'll find something even more important. Namely, that this thing is simple enough to be a lot of fun.

Take a good look at this screen because it, you, and a joystick are the whole story here.

That's you at the right end of the staff of notes — the little hand. Move the joystick, and you move the hand. Use it to carry notes up to the staff. Lay in rests, signatures, clefs, then point



to the little piano in the lower right and listen, because you'll hear the whole thing played back.

Move those little scales in the middle up and down to vary the music's speed, sound quality, and volume. Use



the scissors to cut out whole measures, then use the glue pot to paste them in somewhere else. Got a printer? Great. Print the score out and show it off to your friends.

But what if you're not up to writing your own stuff yet? No problem. There are twelve pieces of music already in here, from rock 'n roll to baroque. They're fun to listen to, and even more fun to change. (Apologies to Mozart.)

The point is, the possibilities are endless. But if you're still skeptical, visit your nearest Electronic Arts dealer and do the one thing guaranteed to send you home with a Music Construction Set in tow.

Boot one up. Point to the piano. And listen.



MUSIC CONSTRUCTION SET is now available for Apple II, II+, IIe, and Commodore 64 computers. The Apple version, with a Mockingboard,™ plays chords of up to six notes each. The Commodore version plays chords of up to three notes each. Apple is a registered trademark of Apple Computer. Commodore is a registered trademark of Commodore Business Machines, Inc. For more information about Electronic Arts, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.

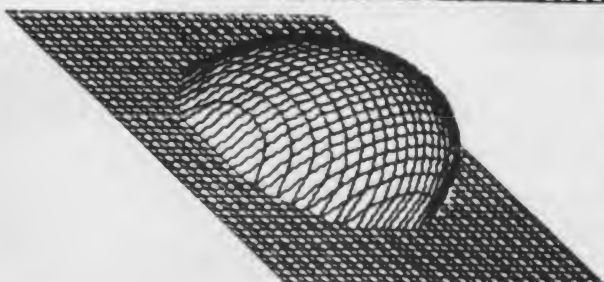
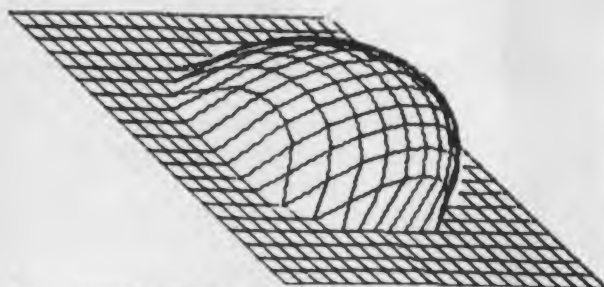
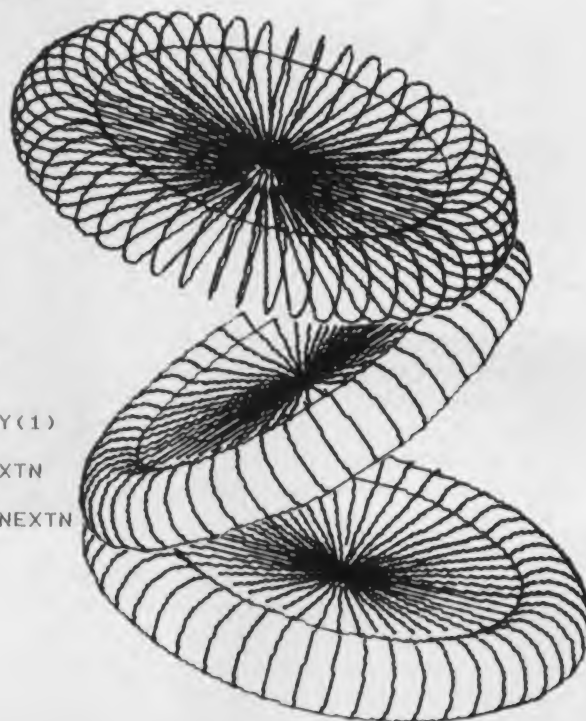
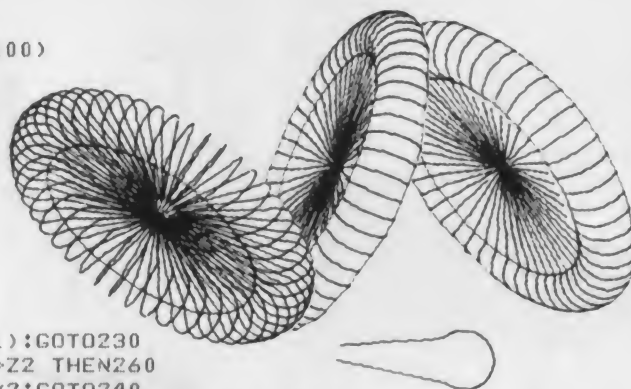
Plotter Tutorial, continued...

Listing 6.

```

10 DIM X(50),Y(50),EX(100),EY(100),IX(100),IY(100)
11 PI=3.1415:INPUT"ANGLE";A3
20 GOSUB380 :S=PI/20:A3=A3*PI/180:A=A3
30 FOR Z=0 TO 2*PI STEP S:E=E+1
40 IF SW=1 THEN GO
50 IF Z>PI THEN A=-A:SW=1
60 A$="MOVE":X=0:Y=0:GOSUB1000
70 F1=0:IF Z>PI/2 AND Z<=PI*1.5 THEN F1=1
80 FORN=1 TO C
90 IFN=9 THEN IX(E)=X:IY(E)=Y
100 IF N>15 AND GN=1 THEN GOTO310
110 IFABS(COS(Z))>.377 THEN 160
120 IF Z<PI THEN Y2=Y1:Y1=Y(N):Z1=X(N):Z2=X(N-1):GOTO230
130 Y2=Y(N):Y1=Y(N-1):Z1=-X(N-1):Z2=-X(N):IFZ1>Z2 THEN260
140 NA=ATN((Y1-Y2)/(Z2-Z1)):IFNA<A3 THEN DA=A3*2:GOTO240
150 GOTO260
160 A1=Z:IF F1=1 THEN A2=A1+.03:GOTO180
170 A2=A1-.03
180 Y1=Y(N):X1=X(N)*COS(A1):Z1=X(N)*SIN(A1)
190 Z2=X1*TAN(A2):XN=X1/COS(A2)
200 IF XN>114.28 THEN 260
210 IFXN<=80 THEN Y2=XN/8+4:GOTO230
220 DI=XN-94.28:Y2=SQR(400-DI*DI)
230 DA=ATN((Y2-Y1)/(Z1-Z2))
240 IF DA>A3 THEN GN=1:EX(E)=X:EY(E)=Y:GOTO260
250 IF GN=1 THEN GN=2 ELSE GN=0
260 Y=Y(N):Z1=X(N)*SIN(Z)*COS(A):IFZ1=0 THENZ1=.0001
270 Z1=ABS(Z1):X=X(N)*COS(Z):D=SQR(Z1^2+Y^2)
280 AN=ATN(Y/Z1)+A:Y=SIN(AN)*D:X=INT(X):Y=INT(Y)
290 IFGN<>0 AND N>5 THEN A$="MOVE":GOSUB1000 :GOTO310
300 A$="DRAW":GOSUB1000
310 NEXTN:GN=0:NEXTZ
320 E=E+1:IX(E)=IX(1):IY(E)=IY(1):EX(E)=EX(1):EY(E)=EY(1)
330 X=EX(1):Y=EY(1):A$="MOVE":GOSUB1000
340 FORN=2 TO E:X=EX(N):Y=EY(N):A$="DRAW":GOSUB1000 :NEXTN
350 A$="MOVE":X=IX(1):Y=IY(1):GOSUB1000
360 FORN=2 TO E:X=IX(N):Y=IY(N):A$="DRAW":GOSUB1000 :NEXTN
370 END
380 FORX=10 TO80STEP10
390 C=C+1:X(C)=X:Y(C)=X/8+4
400 NEXTX:A1=2.3661952:A2=-A1:S=-.1745328
410 CX=94.28:C=C-1
420 FORA=A1 TO A2 STEPS
430 C=C+1:X(C)=COS(A)*20+CX:Y(C)=SIN(A)*20
440 NEXTA:C=C-1
450 RETURN

```



Listing 7.

```

10 AN=30*3.1415/180:AC=26*3.1415/180
20 F1=1:ST=20
30 FORZG=-100 TO 100 STEP ST:Z=ZG
40 FORXG=-100 TO 100 STEP ST:X=XG
50 IF ZG<-60 THEN 100
60 IF ZG>60 THEN 100
70 RA=SQR(60^2-ZG^2)
80 IF XG<-RA OR XG>RA THEN 100
90 Y=SQR(RA^2-XG^2):GOTO110
100 Y=0
110 GOSUB120 :GOTO350
120 IF Z=0 THEN Z=.001
130 Z2=-TAN(AN)*XG:DZ=Z2-ZG:IFDZ<=0 THEN 220
140 L1=DZ*SIN(AN):X1=XG+COS(AN)*L1:Z1=Z2-SIN(AN)*L1
150 IF X1<-60 OR X1>60 THEN Y1=0:GOTO180
160 RA=SQR(60^2-X1^2):IFZ1^2>RA^2 THEN Y1=0:GOTO180
170 Y1=SQR(RA^2-Z1^2)
180 L=SQR(DZ^2-L1^2):DY=Y1-Y:DA=ATN(DY/L)
190 IF DA>AC THEN F2=1:GOTO290
200 IF F2=1 THEN F2=2:GOTO220
210 F2=0
220 IF ZG<0 THEN A=AN:GOTO240
230 A=-AN

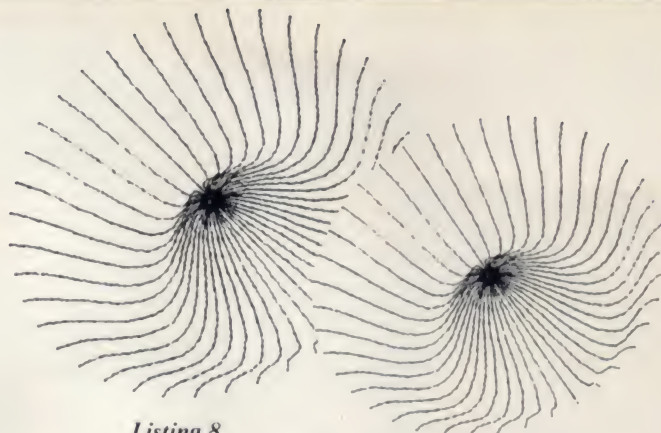
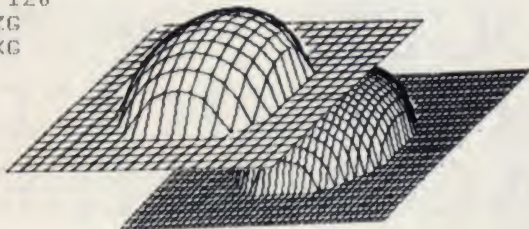
```


Listing 7. (continued)

```

240 L=SQR(ZC2+YC2):Z=ABS(Z)
250 A1=ATN(Y/Z):A2=A1+A
260 YZ=INT(SIN(A2)*L)
270 L=SQR(ZC2+XC2):A1=ATN(X/Z):A2=A1+A
280 XZ=INT(SIN(A2)*L)
290 IF F2<>0 THEN A$="MOVE":GOTO330
300 A$="DRAW"
310 IF F1=2 AND ZG=-100 THEN A$="MOVE"
320 IF F1=1 AND XG=-100 THEN A$="MOVE"
330 XX=X:YY=Y:X=XZ:Y=YZ:GOSUB1000 :X=XX:Y=YY
340 RETURN
350 NEXT XG
360 NEXT ZG
370 F1=2
380 FOR XG=-100 TO 100 STEP ST:X=XG
390 FOR ZG=-100 TO 100 STEP ST:Z=ZG
400 IF XG<-60 THEN 450
410 IF XG>60 THEN 450
420 RA=SQR(60C2-XG2)
430 IF ZG<-RA OR ZG>RA THEN 450
440 Y=SQR(RA2-ZG2):GOTO460
450 Y=0
460 REM DRAW POINT GIVEN XG,ZG, AND Y
470 GOSUB 120
480 NEXT ZG
490 NEXT XG
500 END

```



Listing 8.

```

10 PI=3.1415926:P2=PI*2:S=PI/20
20 S1=PI/10:TI=60:XI=150/P2
30 FORAN=0 TO P2 STEPS
40 IFAN<=PI THEN A1=TI*PI/180:GOTO60
50 A1=-TI*PI/180
60 FOR N=0 TO P2 STEP S1
70 Y=COS(N)*42:X=COS(AN)*N*XI
80 IFSIN(AN)=1 THEN Z=N*XI:GOTO100
90 Z=TAN(AN)*X
100 Z=ABS(Z):IFZ=0THENZ=.001
110 L=SQR(ZC2+YC2):A=ATN(Y/Z)+A1
120 Y=L*SIN(A)
130 IFN=0 THEN A$="MOVE":GOTO150
140 A$="DRAW"
150 X=INT(X):Y=INT(Y):GOSUB1000
160 NEXTN
170 NEXTAN
180 END

```

CHEMISTRY IS THE COMPLEX SUBJECT MANY STUDENTS FAIL FOR A SIMPLE REASON.

Many of the 60,000 students who fail Introductory Chemistry each year fail for one simple reason: they never really get a firm grasp on balancing equations (or *stoichiometry*). The first time they get stuck, and no one's there to get them out of trouble, they just skip over the problem—which only reinforces the confusion. And because an understanding of stoichiometry is crucial to all other concepts in chemistry, as the course progresses they fall further and further behind.

WILEY'S JUST TAKEN THAT SIMPLE REASON AWAY.

THE CHEMISTRY TUTOR:
Stoichiometry & Balancing Equations
Frank P. Rinehart
College of the Virgin Islands, St. Thomas

Your student needs individualized help in order to stay on top of the material. Wiley's CHEMISTRY TUTOR gives that one-to-one attention so hard to come by in large lecture classes. It's an interactive tutorial program that teaches students how to balance equations the same way a qualified instructor does—in careful, step-by-step detail.

NO MORE CONFUSION, EVER.

The secret lies in THE CHEMISTRY TUTOR's amazing flexibility. It's programmed to give specific responses to any answer students may enter—no matter how close or off-base they may be. If the answer punched is incorrect, CHEMISTRY TUTOR instantly recognizes where the confusion lies and asks questions designed to lead students back on track. By the time they reach the right answer, they also understand where they went wrong in the first place.

ELUCIDATING, NOT FRUSTRATING.

The equations on CHEMISTRY TUTOR run the gamut of appropriate problems, including full coverage of stoichiometric and limiting reagents calculation. Students choose the level of difficulty they feel ready for, but may switch to another level at any time. CHEMISTRY TUTOR is self-paced instruction, with clear explanations whenever, and for however long, they need it. So there never has to be an unmanageable equation: only a challenging one.

THE CHEMISTRY TUTOR runs on the Apple® II+ / IIe with one disk drive.

October 1983 ISBN 0 471 80274-3 \$25.00

Coming soon: THE CHEMISTRY TUTOR: Oxidation Reduction Reactions

WILEY
EDUCATIONAL
SOFTWARE

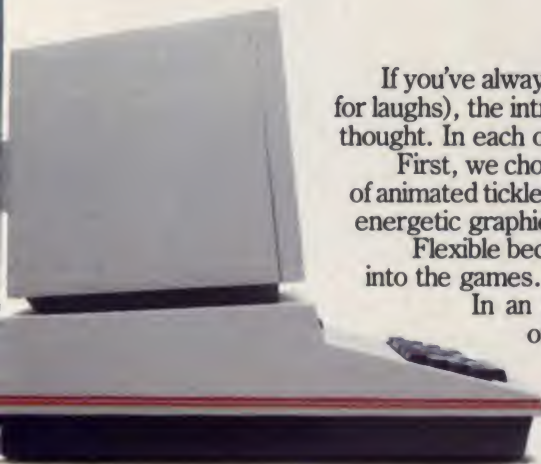
JOHN WILEY & SONS, Inc.
605 Third Avenue, New York, N.Y. 10158

For further information, or to order, write to Bill Rosen,
Dept. 4-1521

Apple® is a registered trademark of Apple Computer, Inc.

4-1521

**READER'S DIGEST
INTRODUCES SOFTWARE
GOOD ENOUGH TO GO OUT AND
BUY A COMPUTER FOR**



If you've always thought of a computer as an expensive toy (or if the one you own now is used for laughs), the introduction of Reader's Digest Software™ games will give you pause for a lot more thought. In each of our programs we have done something quite unique.

First, we chose specific educational objectives. Then we created the games—a terrific series of animated ticklers to satisfy the most devoted computer buffs. And finally, we designed colorful, energetic graphics, in each case with a flexible format.

Flexible because most of our programs leave room for players to substitute their own ideas into the games. And the others never play the same way twice.

In an age when a lot of software is either too heavy-handed for much repetition or too frivolous to be taken seriously, Reader's Digest Software has broken fresh ground by striking an easy balance. Between a good learning experience and a good time.

Fun and games for fun and brains. Your children, your teenagers, your computer will approve.

See your dealer for Reader's Digest Software or call Customer Service at 800/431-8800. (In NY, AK, HI: 914/241-5727.)



R E A D E R ' S D I G E S T

READER'S DIGEST SOFTWARE IS A TRADEMARK OF THE READER'S DIGEST ASSOCIATION, INC.

CIRCLE 157 ON READER SERVICE CARD

Plotter Tutorial, continued...

Listing 9.

```
20 PI=3.1415926:P2=PI*2:S=10:MF=100/(PI*2.5):F1=1:YY=-10000
30 HT=30*PI/180:VT=63*PI/180:C1=-120:C2=120
40 FOR ZG=C1 TO C2 STEPS
50 FOR XG=C1 TO C2 STEP S
60 X=XG:Z=ZG
70 L=SQR(ZC2+XC2):IFL>100THENY=0:GOTO90
80 L=L/MF:Y=COS(L)*25
90 GOSUB230
100 NEXTXG
110 NEXTZG
120 F1=2
130 FOR XG=C1 TO C2 STEPS
140 FOR ZG=C1 TO C2 STEP S
150 X=XG:Z=ZG
160 L=SQR(ZC2+XC2):IFL>100 THEN Y=0:GOTO180
170 L=L/MF:Y=COS(L)*25
180 GOSUB230
190 NEXT ZG
200 NEXT XG
210 END
220 REM TILT & PLOT POINTS GIVEN X,Y, AND Z
230 IFZ<0THEN V=VT:H=-HT:GOTO250
240 V=-VT:H=HT
250 L=SQR(ZC2+YC2):Z=ABS(Z):IFZ=0THENZ=.001
260 A=ATN(Y/Z)+V:Y=SIN(A)*L
270 L=SQR(ZC2+XC2):IFX=0 THEN A=PI/2:GOTO290
280 A=ATN(Z/X):IFA<0THENA=A+PI
290 A=A+H:X=COS(A)*L
300 IF F1=1 AND XG=C1 THEN A$="MOVE":GOTO330
310 IFF1=2ANDZG=C1 THEN A$="MOVE":GOTO330
320 A$="DRAW"
330 X=INT(X):Y=INT(Y):GOSUB1000
340 RETURN
```

Modification for Apple II.

```
15 HGR2:HCOLOR=7:XC=140:YC=96
16 XM= :YM=
1000 XP=X*XM+XC:YP=192-(Y*YM+YC)
1010 IFA$="MOVE" THEN XO=XP:YO=YP:RETURN
1020 HPLLOT XO,YO TO XP,YP
1030 XO=XP:YO=YP:RETURN
```

Modification for Color Computer with CGP-115.

```
15 PRINT#-2,CHR$(18):PRINT#-2,"M240,-100":PRINT#-2,"I"
1000 IFA$="MOVE"THEN PRINT#-2,"M";X;",";Y:RETURN
1010 PRINT#-2,"D";X;",";Y:RETURN
```

Modification for TRS-80 Mod I/III with CGP-115.

```
15 LPRINTCHR$(18):LPRINT"M240,-100":LPRINT"I"
1000 IFA$="MOVE"THENLPRINT"M";X;",";Y:RETURN
1010 LPRINT"D";X;",";Y:RETURN
```

Modification for TRS-80 Mod I/III on screen.

```
15 CLS:XC=64:YC=24
16 XM= :YM=
1000 XP=X*XM+XC:YP=47-(Y*YM+YC)
1010 IFA$="MOVE"THENXO=XP:YO=YP:RETURN
1020 IF XO=XP AND YO=YP THEN SET(XO,YO):RETURN
1030 A5=ABS(XP-XO):B5=ABS(YP-YO):IFA5>B5THEN1040 ELSE1080
1040 IFXP>XO THEN C5=XO:D5=XP:E5=YO:F5=YP:GOTO1060
1050 C5=XP:D5=XO:E5=YP:F5=YO
1060 G5=D5-C5:H5=(F5-E5)/G5:FORU5=C5 TO D5
1070 SET(U5,E5):E5=E5+H5:NEXT:GOTO1120
1080 IFYP>YO THENC5=YO:D5=YP:E5=XO:F5=XP:GOTO1100
1090 C5=YP:D5=YO:E5=XP:F5=XO
1100 G5=D5-C5:H5=(F5-E5)/G5
1110 FORU5=C5TOD5:SET(E5,U5):E5=E5+H5:NEXT
1120 XO=XP:YO=YP:RETURN
```


SPECTRUM, A Colorful Look At Math Functions

Function 16.

Christopher J. Shaw

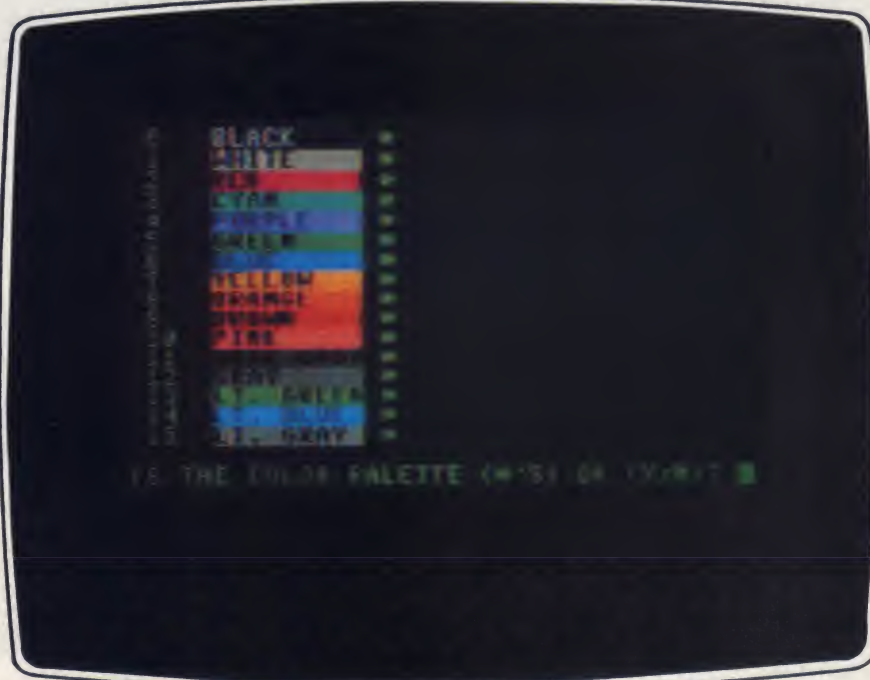
The idea behind Spectrum, the program presented in this article, is quite simple:

Compute the value of a numeric function of two variables, x and y . Use the values of x and y to determine a spot on the screen. Use the function value to designate a color. Display the color at the proper spot. Do this for each spot on the screen.

Spectrum is written in Microsoft Basic and incorporates this algorithm. It also allows you to select any of 25 functions to plot, and you can easily modify it to incorporate your own functions.

Spectrum also allows you to select the color palette to be used—up to the 16-color maximum permitted by the display hardware.

I wrote Spectrum for the Commodore 64 computer, and I have modified it to run on the Vic 20 and on the IBM PC. The Commodore 64 version is given in

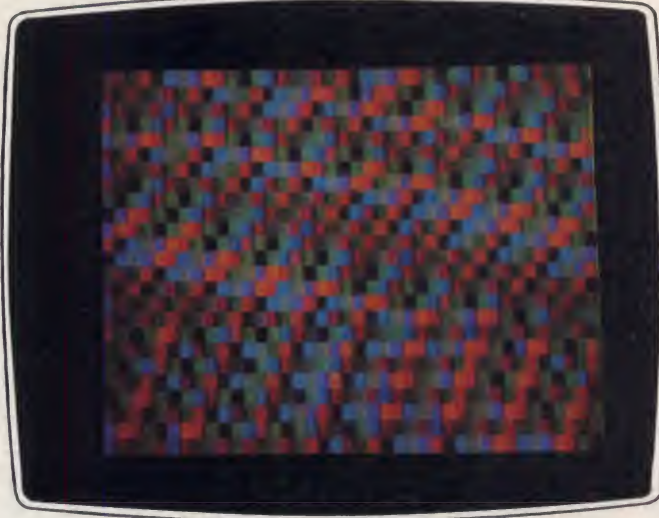


The Spectrum Palette.

Christopher J. Shaw, 517 24th St., Hermosa Beach, CA 90254.



Function 3.



Function 4.



Function 6.



Function 7.

Listing 1. The changes needed for other machines are shown in Listings 2 and 3. (Spectrum won't quite fit into an unexpanded Vic 20, unless you leave out all the REMARKS and unnecessary spaces. And even then you may have to delete one or two of the functions to give it enough room to run.)

Spectrum uses low-resolution color graphics. Each spot on the screen is a character position, and the color is generated by POKEing a reversed blank with the computed color as background.

High-resolution plots are also possible, of course, but the color palette is more limited (four vs. sixteen colors), so the patterns, though more detailed, are less colorful. It also takes 32 times as long to plot the color spectrum of a function in hi-res, and Spectrum is slow enough as it is, particularly for difficult functions.

Spectrum produces some fascinating

color patterns, and it is fun—and curiously soothing—to watch them build up on the screen, eventually overwriting the function definition displayed at the top. But the main fascination of the program, I think, lies in making minor modifications to the functions being plotted, and seeing how these modifications affect the pattern displayed. To get an apprecia-

Spectrum produces some fascinating color patterns, and it is fun—and curiously soothing—to watch them build up on the screen.

tion for this, it is necessary to understand how Spectrum converts a function value to a color number.

Converting A Function Value

To do this, Spectrum first takes the integer part of the function value (using built-in Basic INT function). Then it divides this integer by the number of colors in the current palette and takes the remainder of this division. This remainder, added to the number of the first color in the palette, is the color number for the spot corresponding the values of x and y used in evaluating the function.

If we consider the function value as a binary number, with a binary point somewhere within it, and we assume a 16-color palette, the color number is determined by the four bits, just before the binary point, shown capitalized in the example below.

xxxxxxxxxxxxXxxx,xxxxxxxxxxxx



Function 8.



Function 15.



Function 17.



Function 20.

By redefining the function to include a power-of-two multiplier or divisor, we can, in effect, shift the four color-determining bits either left (by division) or right (by multiplication). This usually has a significant impact on the color pattern.

The most significant bits of the function value are often very regular (zero is typical), and the patterns they produce can be very broad—and dull, sometimes invisible. On the other hand, the least significant bits of the function value are typically fairly random—any patterns are hard to see within the relatively small window of the display screen—so the resulting patterns appear random and, though very colorful, also dull.

The challenge is to experiment with each function until you find a factor—and it doesn't need to be a power of two—that produces a pattern that is neither too regular nor too random.

Another way to change a pattern is to shift it left, right, up, or down. You can do this by adding a term to x or to y everywhere it appears in the function definition. You can also change the scaling of the pattern in the x or y direction by multiplying or dividing x or y everywhere it appears in the function definition by your chosen scaling factor.

Pattern rotation is possible by apply-

**Once you have defined
a function that
generates a pattern
you like, you can
experiment with the
colors.**

ing the appropriate mathematical transformations to the function, but that may be more work than it is worth.

Once you have defined a function that generates a pattern you like, you can experiment with the colors. Spectrum allows you to choose a color palette by specifying the number of colors and the initial color.

After Spectrum displays its initial screen of instructions, you may press RETURN to proceed to the function prompt or space to go to the palette selection menu. A number in the range 3-27 is the proper response to the function prompt, but you may press q to quit the program or enter a number outside the range (e.g., 0) to return to the initial instruction screen and then the color palette menu. After Spectrum finishes plotting a function, you may press any key to be prompted for another function number.



Function 23.



Function 25.



Function 26.



Function 27.

The version of Spectrum given in Listing 1 contains 25 functions in statements 3 through 27. (I have numbered the functions 3 to 27, instead of 1 to 25, to emphasize this.) If you get involved in using the program, you may find that this is not enough. You can easily modify it to hold more functions, but it is even easier to make a separate copy of the program for each set of 25 functions you find interesting.

Defining A New Function

A new function is defined by replacing any statement in the range 3 to 27 to compute the new function value. Be sure to change the corresponding print statement in the 403 to 427 range to display the new function.

The main thing to look out for in defining your own functions is to avoid division by zero (add a small, non-zero term to the divisor) and illegal quantities

caused by out of range function arguments. Of course, the Basic interpreter will tell you about these errors, but sometimes not until you get to the middle of the screen where x and y are both zero.

Some of the functions included in the program are particularly interesting, as you can see from the illustrations accompanying this article.

Function 3, $F=RND(0)$, generates a completely random pattern.

Function 4, $F=TIME$, shows a cer-

tain regularity, indicating that the time needed to execute the major display loop is fairly constant.

Function 16 displays an American flag (almost), the mathematical definition of which relies on the fact that Microsoft Basic treats logical expressions, such as $(A=B)$, as zero when they are false.

Function 8 was displayed on the cover of the May 1982 issue of a magazine called *Computer Graphics and Applications*. A brief article about that cover, by E.P. Miles, Jr. of Florida State University, inspired the development of my program, Spectrum.

If you type the program into your computer, I hope you enjoy investigating the color spectrum of simple mathematical functions as much as I have. And if you find any really neat patterns, be sure to let me know about them. ☐

Listings on pp. 170-172

***I hope you enjoy
investigating the
color spectrum of simple
mathematical functions.***

CAN YOU NAME THE WORLD'S THIRD LARGEST SUPPLIER OF PERSONAL COMPUTERS?



Naming the two largest suppliers of personal computers is easy.

The third one is a little harder. It's NEC.

That's right. NEC is the world's third largest PC supplier.*

We're not talking about video game players that double as computers. We're talking about serious business computers that cost between \$1,000 and \$5,000. Like our APC Advanced Personal Computer.



THERE ARE HUNDREDS OF SOFTWARE PACKAGES THAT RUN ON NEC'S ADVANCED PERSONAL COMPUTER.

Our Advanced Personal Computer is graphically better.

The main reason we sell so many personal computers is that we offer so much.

Take, for example, our APC.

The APC is faster than both the IBM PC and Apple.

It has more storage capacity.

And it offers the sharpest color graphics of any PC at any price.

The APC also has advanced communications capabilities that let it work with all major mainframes.

All in all, the APC is simply your best buy.

Every NEC APC personal computer comes with a \$6.1 billion company.

Buying an APC means you'll get the full support of a \$6.1 billion company. NEC.

And that means you get the service, technology and reliability that NEC is famous for.

decision, call NEC Information Systems at 1-800-343-4419.**



NEC'S PERSONAL COMPUTERS ARE BEING USED BY TENS OF THOUSANDS OF BUSINESSES WORLDWIDE.

The kind of service and support that's made our Spinwriter family the world's best selling letter quality printers for personal computers.

Is NEC on your bid list?

If we're not on your bid list, we should be.

But ask your Data Processing Manager to be sure. If you'd like more information to make your

You'll find out why more and more personal computer users are saying "NEC and me."

NEC AND ME



NEC Information Systems, Inc.
1414 Massachusetts Ave.
Boxborough, MA 01719



NEC'S ADVANCED PERSONAL COMPUTERS HAVE THE SHARPEST COLOR GRAPHICS IN THE INDUSTRY.

*Source: Dataquest

**In Massachusetts, 617-264-8635

® The Apple Logo is a registered trademark of Apple Computer, Inc.

CIRCLE 145 ON READER SERVICE CARD

WRITE YOUR OWN APPLE GAMES

Includes 40 exciting
pre-programmed games
to get you started!

Write Your Own Apple Games is your ticket to thousands of hours of solid game fun.

But it's more than just a game book.

While you're enjoying more than 40 exciting new programs, you'll be learning—quickly and easily—the most advanced techniques of computer game design.

In *Write Your Own Apple Games*, Stuart Anstis explains each game to you in logical, step-by-step subroutines. You'll see crucial game graphics exactly as they should appear on your screen.

Then you'll learn how to rearrange the basic subroutines to create countless game variations.

If you know BASIC, you're ready to learn state-of-the-art game techniques, including how to create smooth, flicker-free screen movement. Generate flashing "neon-sign" graphics. Keep game scores. Use random numbers in game design. And much more.

Write Your Own Apple Games gives you all the skills you need to start designing your own original computer games for fun—and profit!

And because writing your own games gives you greater control of your Apple's numerical and graphic capabilities, you'll be opening the door to fantastic new possibilities for using your computer.

Start having some serious fun with your Apple computer. Send for your copy of *Write Your Own Apple Games* today.



MAIL TODAY TO:
**CREATIVE
COMPUTING
PRESS**

Dept. MA2C

39 East Hanover Avenue, Morris Plains, N.J. 07950

Please send me _____ copies of *Write Your Own Apple Games* for only \$12.95 each, plus \$2.00 shipping & handling per book. #2W.

Total amount \$_____

☐ **Payment Enclosed.** (CA, NJ and NY State residents please add applicable sales tax).

☐ **CHARGE MY:** ☐ MasterCard
☐ American Express ☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Name _____ (Please print)

Address _____

City _____

State _____ Zip _____

*Outside the U.S.A. add \$3 for shipping and handling.

☐ Check here to receive FREE catalog of computing books, magazines and guides.

For faster service, (In NJ only:
PHONE TOLL FREE 201-
800-631-8112 540-0445)

Also available in your local bookstore
or computer store.

Spectrum, continued...

Listing 1. Spectrum for the Commodore 64.

```

1 GOTO 100
2 ONN-2GOTO3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27
3 f= RND(0)*v6: RETURN
4 f= time: RETURN
5 f= SIN(8*x)+EXP(y): RETURN
6 f= (EXP(x)+EXP(-x))/2+LOG(y+SQR(y^2+1)): RETURN
7 f= 3*(ATN(x)+ATN(y)): RETURN
8 f= 3*(x^3-y*y)*SIN((x+y)/20)/(x*x+y*y+.3): RETURN
9 f= (x^2+y^3)/30: RETURN
10 f= ((x^2+y^2)>18)*ATN(x/2+y/2): RETURN
11 f= (SIN(x)-SIN(y))^3: RETURN
12 f= SIN(x-y)+SQR(ABS(x*y)): RETURN
13 f= (SIN(x/5+COS(y)))^7: RETURN
14 f= LOG(1+ABS(x)/(1+ABS(y)))*50: RETURN
15 f= SQR(x^2+y^2): RETURN
16 f= ((x<0)AND(y<1))*(-5)+(((x)=0)OR(y)=1)AND(INT((y-1)/2)AND1))+1: RETURN
17 f= x-y: RETURN
18 f= (x^3-y^5)/100: RETURN
19 f= 9*(SIN(x)+COS(y))^2: RETURN
20 f= EXP(SQR(((x+9)/3)^2/((y/5)^2+.03))): RETURN
21 f= SQR((3*x)^2/((.33333+y^2)): RETURN
22 f= ATN(x)*ATN(y): RETURN
23 f= v6*ATN(EXP(x/9))-ATN(EXP(y))+y: RETURN
24 f= (x^2+3*x*y+y^2-3)/49: RETURN
25 f= SQR(ABS(x)+1)*SQR(ABS(y)+7): RETURN
26 f= 100*v6/EXP(1/(1+ABS(x)+ABS(y)))/33: RETURN
27 f= x*y/v6: RETURN
100 GOSUB 3000: REM set the display parameters
110 GOSUB 2000: GOSUB1000: REM initialization & instructions
120 GOSUB 300: GOSUB 400: REM select & print function
130 FOR j=v3-1 TO 0 STEP -1: FOR i=0 TO v2-1: REM plot from bottom up
140 x=i-v4: y=j-v5: GOSUB 2
150 h=INT(f)-v6*INT(INT(f)/v6)+v7
160 b=j+v2+i: POKE v1+b,h
170 POKE v0+b,160
180 NEXT i: NEXT j
190 GET k$: IF k$="" THEN 190
200 IF k$="q" THEN PRINT"(CLEAR)": END
210 GOTO 120
299 REM input the function number; print the instructions if out-of-range
300 PRINT"(CLEAR)": INPUT"function":n: IF n>2 AND n<28 THEN RETURN
310 GOSUB1000: GOTO 300
399 REM print the function to be plotted
400 ONN-2GOTO403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418
401 ONN-18GOTO419,420,421,422,423,424,425,426,427
403 PRINT" f= rnd(0)*v6 ":RETURN
404 PRINT" f= time ":RETURN
405 PRINT" f= sin(8*x)+exp(y) ":RETURN
406 PRINT" f= (exp(x)+exp(-x))/2+log(y+sqr(y^2+1)) ": RETURN
407 PRINT" f= 3*(atn(x)+atn(y)) ":RETURN
408 PRINT" f= 3*(x^3-y^2)*sin((x+y)/20)/(x^2+y^2+.3) ":RETURN
409 PRINT" f= (x^2+y^3)/30 ":RETURN
410 PRINT" f= ((x^2+y^2)>18)*atn(x/2+y/2) ": RETURN
411 PRINT" f= (sin(x)-sin(y))^3 ":RETURN
412 PRINT" f= sin(x-y)+sqr(abs(x*y)) ": RETURN
413 PRINT" f= (sin(x/5+cos(y)))^7 ":RETURN
414 PRINT" f= log(1+abs(x)/(1+abs(y)))*50 ": RETURN
415 PRINT" f= sqr(x^2+y^2) ":RETURN
416 PRINT" f= ((x<0)and(y<1))*(-5)+(((x)=0)or(y)=1)and(int((y-1)/2)and1))+1"
: RETURN
417 PRINT" f= x-y ":RETURN
418 PRINT" f= (x^3-y^5)/100 ":RETURN
419 PRINT" f= 9*(sin(x)+cos(y))^2 ":RETURN
420 PRINT" f= exp(sqr(((x+9)/3)^2/((y/5)^2+.03)) ": RETURN
421 PRINT" f= sqr(x^2/((.33333+y^2)) ":RETURN
422 PRINT" f= atn(x)*atn(y) ": RETURN
423 PRINT" f= v6*atn(exp(x/9))-atn(exp(y))+y ": RETURN
424 PRINT" f= (x^2+3*x*y+y^2-3)/49 ":RETURN
425 PRINT" f= sqr(abs(x)+1)*sqr(abs(y)+7) ": RETURN
426 PRINT" f= 100*v6/exp(1/(1+abs(x)+abs(y)))/33 ": RETURN
427 PRINT" f= x*y/v6 ":RETURN
999 REM print the instructions
1000 PRINT"(CLEAR)chris shaw's"
1010 PRINT"color spectrum plotter"
1020 PRINT
1030 PRINT"plot the color"
1040 PRINT"spectrum of any of 25"
1050 PRINT"functions, numbered 3"
1060 PRINT"to 27, by entering the"
1070 PRINT"function number in"
1080 PRINT"response to the"
1090 PRINT"function prompt."
1100 PRINT
1110 PRINT"after a plot is done,"
1120 PRINT"press any key to be"
1130 PRINT"prompted for another"
1140 PRINT"plot."
1150 PRINT
1160 PRINT"press 'space' to"
1170 PRINT"change the color"

```




The Best Just Got Better

Introducing the new Strobe Models 260 and 200 Graphics Plotters. How do you make the world's most cost-effective graphics system even more remarkable? Simple. Make it easier to use, more powerful, more versatile and more attractive. The hard part is doing all of the above while holding the line on a very affordable price. With the new Models 260 and 200 Graphics Systems, Strobe has done it all. And the benefits are all yours.

The Strobe 260 is the first eight-pen plotter and software package available for under \$1,000. With just a few keystrokes on your computer, the system produces superb high-resolution charts, drawings and transparencies with up to eight automated color breaks. The even more economical Model 200 produces the same wide range of graphics with a single pen which may be changed manually.

The new Strobe plotters interface with virtually every popular microcomputer made today, including the Apple II, IIe and III, Victor, IBM PC, Kaypro

and Osborne systems. What's more, the StrobeWare software programs provide every graphic format you will probably ever need, including multicolor pie charts, bar graphs, line graphs, text processing, and a broad selection of symbols and character styles. To further increase your capabilities, the new Strobe systems also interface with over 40 other popular graphics programs.

Every feature of the new Strobe Graphics System is designed to give you the highest quality graphics quickly, easily and inexpensively. The system also looks very nice on your desk. So visit your local dealer today and see how much better the best can be.



Apple II, IIe and III, Victor, IBM PC, Kaypro and Osborne are trademarks of Apple Computer, Inc., Victor United, Inc., International Business Machines Corporation, Kaypro Corporation, and Osborne Computer Corporation, respectively.



Strobe Inc.
897 5-A Independence Ave.
Mountain View, CA 94043
415/969-5130

The Strobe Graphics System

Seeing is believing

CIRCLE 198 ON READER SERVICE CARD

CARD TRICKS.



(Or how to add six functions to your IBM PC/XT with just one multifunction card)

It's not magic. And it isn't sleight of hand. It's ConsoCard from Consolink... the multifunction card for your IBM PC OR PC/XT that performs six tricks from a single slot space.

- Up to 384K expansion memory for larger in-memory data bases.
- Printer spooling for computing even when the printer is printing.
- RAM disk emulator for fast access to frequently used files.
- TWO asynchronous RS-232 ports for communication with other computers.
- Battery powered chronograph for accurate time keeping.

One Card. Six Tricks.



ConsoCard
Without it, your IBM
isn't playing with a full deck.

CONSOLINK
CORPORATION

1840 Industrial Circle • Longmont, CO 80501
(303) 651-2014 • Toll Free 800-525-6705

Subsidiary of Consolink Corp. This company's corporate name is CONSO CARD READER SERVICE CARD.

Spectrum, continued...

```
1180 PRINT "palette; press"
1190 PRINT "return" to continue."
1240 GET k$: IF k$="" THEN 1240
1250 IF k$ <> CHR$(32) THEN PRINT "(CLEAR)": RETURN
1259 REM print the color palette
1260 PRINT "(CLEAR)"
1270 FOR i=0 TO 15: p$=" (GREEN)*": IF i<v7 OR i>=(v6+v7) THEN p$=""
1280 PRINT " (GREEN)" i, "(LEFT5)" c$(i); p$: NEXT i
1290 PRINT: PRINT "is the color palette"
1300 INPUT "(s) ok (y/n)": k$
1310 IF LEFT$(k$,1)="y" THEN RETURN
1320 INPUT "how many colors": v6
1330 IF v6<2 THEN PRINT "not enough colors": GOTO 1320
1340 INPUT "of first color": v7
1350 IF (v6+v7)>16 THEN PRINT "too many colors": GOTO 1320
1360 GOTO 1260
1999 REM read the color palette
2000 DIM c$(15): FOR i=0 TO 15: READ c$(i): NEXT i
2010 DATA " (WHITE)black"
2020 DATA " (WHITE,RVS)white (RVSOFF)"
2030 DATA " (RED,RVS)red (RVSOFF)"
2040 DATA " (CYAN,RVS)cyan (RVSOFF)"
2050 DATA " (PURPLE,RVS)purple (RVSOFF)"
2060 DATA " (GREEN,RVS)green (RVSOFF)"
2070 DATA " (BLUE,RVS)blue (RVSOFF)"
2080 DATA " (YELLOW,RVS)yellow (RVSOFF)"
2090 DATA " (ORANGE,RVS)orange (RVSOFF)"
2100 DATA " (BROWN,RVS)brown (RVSOFF)"
2110 DATA " (PINK,RVS)pink (RVSOFF)"
2120 DATA " (DK.GRAY,RVS)dark gray (RVSOFF)"
2130 DATA " (GRAY,RVS)gray (RVSOFF)"
2140 DATA " (LT.GREEN,RVS)lt. green (RVSOFF)"
2150 DATA " (LT.BLUE,RVS)lt. blue (RVSOFF)"
2160 DATA " (LT.GRAY,RVS)lt. gray (RVSOFF)"
2170 RETURN
2999 REM set the display parameters for the commodore 64
3000 v0=1024: v1=55296: v2=40: v3=25: v4=v2/2: v5=INT(v3/2): v6=16: v7=0
3010 POKE 53280,0: POKE 53281,0
3020 RETURN
```

Listing 2. Make these changes to Listing 1 to run Spectrum on the Vic 20.

```
3000 v0=7680: v1=38400: v2=22: v3=23: v4=v2/2: v5=INT(v3/2): v6=16: v7=0
3005 IF 4*(PEEK(36866)AND128)+64*(PEEK(36869)AND112)=4096 THEN v0=4096
      v1=37888
3010 POKE 36879,8
3020 RETURN
```

Listing 3. Make these changes to Listing 1 to run Spectrum on the IBM PC.

```
3 f=RND*v6: RETURN
4 f=VAL(RIGHT$(time$,2)): RETURN
160 b=2*(j+v2+i): POKE b+1,h
170 POKE b,219
190 k$=inkey$: IF k$="" THEN 190
200 IF k$="q" THEN cls: END
300 width 80: cls: INPUT "function": n: IF n>2 AND n<28 THEN RETURN
403 PRINT "rnd*v6": RETURN
404 PRINT "val(right$(time$,2))": RETURN
1000 width 40: cls: PRINT "chris shaw's"
1240 k$=inkey$: IF k$="" THEN 1240
1250 IF k$ <> CHR$(32) THEN RETURN
1260 cls
1270 FOR i=0 TO 15: COLOR 2: PRINT i; p$=" *"
      : IF i<v7 OR i>=(v6+v7) THEN p$=""
1280 COLOR i: PRINT TAB(5) string$(5,CHR$(219));: COLOR i-(15-i)*(i=0 OR i=8)
1285 PRINT c$(i);: COLOR 2: PRINT p$: NEXT i
2010 DATA " black"
2020 DATA " blue"
2030 DATA " green"
2040 DATA " cyan"
2050 DATA " red"
2060 DATA " magenta"
2070 DATA " brown"
2080 DATA " light gray"
2090 DATA " dark gray"
2100 DATA " light blue"
2110 DATA " light green"
2120 DATA " light cyan"
2130 DATA " light red"
2140 DATA " light magenta"
2150 DATA " yellow"
2160 DATA " white"
2999 REM set the display parameters for the ibm pc
3000 DEF seg=kfb800: v2=80: v3=25: v4=v2/2: v5=INT(v3/2): v6=16: v7=0
3010 screen 0,1: COLOR 10,0: Key off
```


This 3 hour coffee break is brought to you by your printer.



Wait-less ComputingTM is brought to you by MicroSpoolerTM.

In the business world, time means money. So you want your computer to make the most of every minute. But while your printer is busy printing, your computer is busy... **waiting**.

MicroSpoolerTM from Consolink keeps your computer free for use even when your printer is operating. It stores data, then sends it at the fastest rate your printer will accept. There's no down time, so there are no needless coffee breaks. And your computer is back on the job in seconds... **working** instead of waiting.

Because MicroSpoolerTM is a stand-alone buffer, it can be easily

installed in-line between almost any printer and computer, as well as communications and peripheral devices. And its attractive case and compact size allow it to fit comfortably in any office environment.

Standard features include:

- 16K memory—expandable to 64K
- Status readout—displays amount of data stored or number of copies left to run (up to 99)
- Internal power supply—eliminates extra cost and bulky adaptors.

MicroSpoolerTM from Consolink. When you want your computer to **wait less**... and **work more**.



CONSOLINK CORPORATION

1840 Industrial Circle, Longmont, CO 80501 (303) 551-2014 Toll Free 800-525-5705 FAX 310-830-0700

CIRCLE 113 ON READER SERVICE CARD

Subsidiary of Commission Packaging Corporation

How To Get Moiré From Your Computer

Would you like some out-of-the-ordinary computer art to decorate your office, country club, or refrigerator door? Say no moiré! This article is for you. Stack up a supply of paper and get a new ribbon in your printer, I have found that this pursuit is habit forming. And besides providing some nice printouts, the programs presented may help you in related endeavors of your own.

Moiré (mwah-ray) patterns are those sometimes surprising patterns that appear when two similar images (overlays) are laid one over the other. You can see moiré patterns easily by looking through two combs held together but slightly askew, or by looking through the folds of the sheer draperies on your windows.

Moiré patterns are graphics, but even with straight alphanumeric screens and printers, some very good patterns can be produced. More spectacular images can be made on graphics terminals and dot matrix graphics printers. This article

Mark Gardner

leaves no one out. Figure 1 shows an example of line printer and graphic printer moiré patterns.

I've done this work mostly in MBasic under CP/M on a Toshiba T100. Some of the patterns were produced with Toshiba TBasic, with graphics commands similar to those (CIRCLE, LINE, PSET, etc.) found in Basic on the IBM PC. Some examples were made using a Kaypro with a Vectrix VX384. I used a variety of equipment and approaches to generate the patterns presented here, so you should be able to use parts of the article immediately. For the rest, the principles are clear, and you can easily adapt the procedures to your own system.

Everyone Does It

Almost everywhere you look these days you see samples of computer art—from simple string drawings to

sophisticated animated graphics in full color. Most common are string drawings. Also prevalent are pleasant geometric patterns and simple drawings, as on computer printed Christmas calendars and wall-wide Happy New Year printouts. Less common are examples of random and ordered dithering and random placement of identical patterns.

Of all these, moiré patterns are perhaps closest in spirit to the string drawings, but are fundamentally different. In string drawings, the illusion of curves is given by placing straight lines tangential to the implied curves. In moiré patterns, the implied curves "appear"; they are related to the intersections of the lines or curves in the overlays.

Who Was Moiré?

With a name like that, it is easy to guess that moiré patterns must be named after some famous French mathematician, right? Wrong! *Moiré* is from the French word for "watered" or "wetted" and has long been used to describe tex-

tiles, particularly silk, treated specially to give the surface a water-wave look. The original process may have been an oriental invention, thousands of years ago, but moiré textiles are still popular and available. Heavier moiré textiles are common as drapery material.

British physicist Lord Rayleigh (ca. 1874) seems to get credit as the first to suggest practical uses for the patterns (as if the art possibilities were impractical). In fact, moiré patterns, carefully done, can represent solutions to a wide number of physical problems—the field surrounding a magnetic dipole, for example. If you have more interest in this, check my best reference, G. Oster and N. Nishijima, "Moiré Patterns," *Scientific American*, 208(5):54-63, 1963. That article gives excellent examples. I have tried to reproduce some of the effects of that reference for this article.

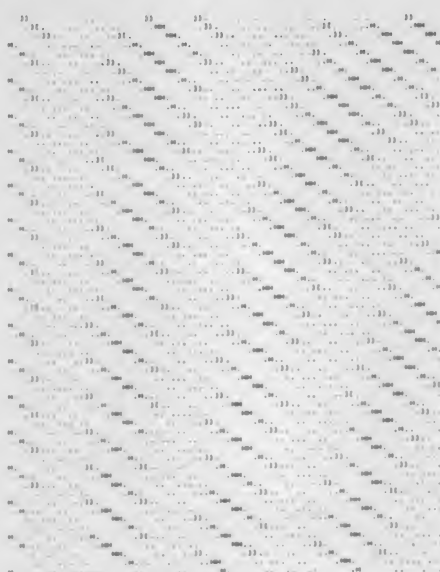
What Are Moiré Patterns?

Moiré patterns result when two or more sets of curves or lines are placed one over the other and viewed together. In a sense, the moiré pattern is an optical illusion, since you can claim it really doesn't exist, but you can see it.

The illusion comes from the eye's perception of increased and decreased boldness of pattern density produced by intersections of the two overlays. This is similar to physical interference in wavefronts and hysteresis (beating) between sounds: when two waves are in phase they add for a large amplitude, and when out of phase they subtract for low amplitude. Moiré patterns are a little different; two overlays exactly in phase match precisely, and no pattern emerges. The moiré comes when lines are close, but not exactly lined up. The moiré patterns in textiles are authentically produced by folding a cloth, then pressing it to impose the weaving pattern against itself. Absolute alignment is impossible, so the classical moiré is produced.

The overlays used to create moiré patterns are usually regular, repetitive, and similar. The two are slightly different, but not *too* different. The following are options that create moiré patterns:

- Identical overlays, but offset slightly (good for concentric patterns—squares, circles, ellipses).
- Identical overlays, but rotated slightly (good for overlays composed of straight lines).
- Overlays not identical, but with similar contents (circles with ellipses, squares with rectangles, hyperbolas with parabolas).
- Overlays different only in scale (cross hatching).
- Overlays similar, but where spacing is controlled by different functions. This



1A



1B

Figure 1. Examples of computer printed moiré patterns: (A) with character graphics, (B) with dot matrix graphics.

is variable scale (interesting with straight lines).

- Overlays similar, but where shape is modified slightly by some function (a family of ellipses overlaid on circles, where each ellipse in the first overlay has a slightly different aspect).

- Miscellaneous other pairings of overlays, some no doubt yet undiscovered. In my work, I accidentally produced a "non-existent" moiré pattern. More later.

Using Character Displays

As computer hobbyists, we have two media in which to paint our moiré patterns: our display screens and our printers. Either may be a "graphics" product, i.e., using pixels rather than character locations. This certainly makes for more interesting patterns, but some good patterns can be produced on ordinary screens and printers, too. The examples presented in this section were made under MBasic and printed on a ProWriter printer at 10 pitch.

Plotting with characters on a screen gives a resolution of about 80 x 24. On a character printer, that increases to roughly 80 x 66. Screen character displays are usually fixed, but often a printer can be changed easily to an elite or condensed font and eight lines per inch, which might increase the 80 x 66 limit to 132 x 88. That is not super, but let's see what even the lower printer limit can do. (The examples shown here are all printed. To see them on a screen,

use PRINT instead of LPRINT in the programs.)

The first problem I encountered was how to embolden the intersections for CRT display or printing. After some experimentation, I settled on using a period to show the curves by themselves and an H to show points of intersection. I found also in my experiments that the low resolution would often keep curves from intersecting, that is, from crossing a horizontal character line in the same column position. Consequently, I decided to use the character pair][in the two adjacent columns where "near intersections" occurred. This is a little like an H centered between two columns. The results of these choices can be seen in the example of Figure 1A.

Second, I faced the problem of getting the curves into shape for meaningful printing. Rather than calculate directly to a line of print or screen display, I chose to work with an array of numbers sized to match a printed page. Hence, in the programs presented here, there is a PRINTARRAY dimensioned into (80,63) elements. The program sets the 1 bit of any element that is a member of overlay 1, and the 2 bit of any element that is a member of overlay 2. When finished, then, any element that is at an intersection has the value 3. After all the array calculations are finished, it is quite easy to plot it out with H's and]['s according to the previous decisions.

In the low resolution of character graphics, overlays of just straight lines



Hear at last. Games with

Alien annihilation never sounded so good.

Because we've broken the sound barrier on home computer games. With music. You heard right. Music.

And we're not talking mamby-pamby little bleeps here, pal.

We're talking
toe-tapping,

finger-snapping,

Top-40 stuff. Scored

just for our newest releases.

And playing throughout.

Which ought to keep a Joystick Jockey like yourself humming right along through each and every blast, bomb and blow-up that threatens your existence.

From strategy games to shoot 'em ups.

Are you ready to face the music?

*If Our Music Has You Hearing Things,
Wait Till You See This.*

Incredible, arcade-quality graphics.

And they're so great—how great are they? They're so great you'll want to play

them again and again. And then you'll tell your friends about them. And they'll want to play. And then your family will find out and they'll all want to play. And then that fat kid down the block will want to play. And all your sister's friends. And their boyfriends. And... better keep our newest releases a secret. Or get Dad to pop for another Atari.

*The First Games Ever, That Tell You What
The Heck Is Going On, Right At The Start.*

It's just like a movie.

Except, instead of filling both hands with buttery popcorn, you've got your hand on the Joystick, tensed up for what's to come.

And while you wait, poised, ready, eager, you'll find out, through the terrific screen titles, the objective of the game, the characters and the scenario.

You'll find out what planet you're on.

What the fuss is all about.

Why you're involved.

And perhaps of singular importance to you, how to keep from being obliterated.



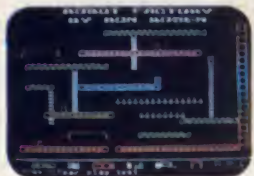
real music for your Atari.*



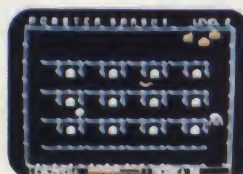
Our star. Our Numero Uno. The Tail of Beta Lyrae™ Changes as you play. Will drive you out of your mind with unexpected switcheroonies. No one's ever mastered it. But you sure can try...



And then there's Cosmic Tunnels™. Four games in one. Meaning four times the challenge. Four times the chance you might just get blown away. The graphics are sure to blow your mind!



Mr. Robot and His Robot Factory™ Looking for a factory job? Here's an opening. Help Mr. Robot thwart the aliens. Screens scream with color, action and sound! Plus, a graphics kit to design your own game screens!



Monster Smash™ is the gravest game to ever hit the cemetery. And it's filled with a deathly strategy. What do you have to do? Mash the monsters! Let the visitors live.



Cohen's Tower™ gets you used to life in the Big City fast. Starting you off in a skyscraper. But the boss is really watching. So work fast. You might just get a raise... if you can handle the action.

Get ready to bring your Atari the most playable, the most graphically involving new games it's ever screened. Or heard.

It's the most out of our minds.

And together, with your Atari, we make beautiful music.



DATAMOST

The most out of our minds.™

TM is a registered trademark of Datamost, Inc. 8943 Fullbright Ave., Chatsworth, CA 91311 (213) 709-1202 *Atari is a registered trademark of Atari Computers Inc. ©Datamost 1983

CIRCLE 197 ON READER SERVICE CARD



New TGS Version with Special Free
Expansion Module works with KoalaPad™
and Gibson Light Pen™



THE GRAPHIC SOLUTION

Solve your toughest communication problems with the Graphic Solution™, a sophisticated, new graphics package from Accent Software.



With precise, multi-speed ANIMATION create captivating sales presentations and product demonstrations that will both intrigue and inform your clients and customers. Watch their reactions; you'll see your messages getting through.

Develop educational materials and training aids that MIX TEXT AND GRAPHICS on the screen, breathing new life into abstract, hard-to-grasp concepts. Mix programs too. Images can be displayed on back-grounds loaded from any of your other programs. Construct custom TYPEFACES AND TYPESIZES to balance the visual elements.

Tired of run-of-the-mill business graphics? Change standard charts and graphs into colorful THREE DIMENSIONAL PERSPECTIVES. Add text and animate the data to show the

relative rates of change for your most important information. Like cash flow projections. Or revenue estimates.



Plot flowcharts, time and motion studies, industrial process flows with COLOR-CODED ELEMENTS highlighting critical paths. Animate the sequences to show how flows actually progress.

Work with live action? Prepare film and videotape storyboards using the unique FRAME-BY-FRAME graphic sequencer that lets you create and animate a video story before shooting.

Whatever your graphic communication demands—in the business world, the arts, industry, education—The Graphic Solution™ at \$149.95 has the answer. Take a hard look at The Graphic Solution. You'll like what you see.

The Graphic Solution requires a 48K Apple II with ROM Applesoft and DOS 3.3.

See your local dealer or send \$10.00 for a demonstration diskette to:



ACCENT SOFTWARE, INC.

3750 Wright Place, Palo Alto, Calif. 94306 Telephone 415-856-6505

Apple is a registered trademark of Apple Computer, Inc.

Moiré, continued...

don't work very well, by which I mean that the resulting patterns are not very obvious or interesting. Curves work better. Further, if the lines in two overlays cross at steep angles, the effect is not very good; it is better that the lines be nearly parallel. The step or distance between overlay lines is critical, too, and should not be too small, or the display will be cluttered or too large, or the moiré pattern will not be easily visible. All of these considerations apply to pixel pattern moirés as well.

I wrote two sorts of program, both using the PRINTARRAY technique. The first kind of program used generating functions to locate the elements of each curve. For example, $Y=X/2-I$ is a generating function for a family of straight lines (remember the math, $y = mx + b$). The counter I is stepped in the program to generate each member of the family of curves in the overlay.

The second sort of program was developed because I wanted to work with "zone plates" (to be described). There was no easy generating function, so the alternate approach was to determine for each element of the PRINTARRAY whether or not it was a member of the pattern.

Listing 1 shows the program that generated the character example of Figure 1A. The program has three main sections. Lines 10 through 110 define the print array and the generating functions. Lines 130 through 370 fill the array with the overlays. Lines 390 through 510 print the array (interpreted to H's and J's) to the line printer. To get other moiré patterns with this program it is necessary only to change lines 100 and 110, and sometimes lines 180 and 290, since the range and step in the index I may need revision for the specified family to cover the printed page.

The work with "Fresnel zone plates" required a different approach to the generation of the print array. In a zone plate, the pattern is made up of concentric rings in which the area of each ring is the same, including the non-shaded rings and the central circle. The moiré patterns made with zone plate overlays have remarkable properties, and I wanted to see if they would be evident even with low-resolution character graphics.

The program in Listing 3 fills the print array with a zone plate image by what I call "brute force." It is not amazingly clever, but it gets the job done. It examines each element of the array, determines what band of the zone plate it is in, and assigns the element to be light (a space, 0 in the array), or dark (a period, 1 in the array). The program actually calculates two zone plates, one offset from the other by the amount B in

Listing 1. The character moiré program with all comments. The generating functions are at lines 100 and 110, the family generating loops at lines 180 and 290.

```

10 REM ; PRNMOIR1.BSC 7/31/83 MARK GARDNER
20 REM ; Program to generate pseudo-moire patterns on non-graphics printer.
30 REM
40 REM ; Define square array for printer (x[col] by y[line])
50 REM ; (Column #80 is not printed, allows J+1 subscript in print routine)
60 DIM PRINTARRAY(80,63)
70 REM
80 REM ; Establish functions for filling. Functions must be structured
90 REM ; such that an index will generate a family of curves.
100 DEF FNPAT1 = X/2 - I
110 DEF FNPAT2= X/(2.8 - .8*1/79) - I
120 REM
130 REM ; Execute the functions to fill the array
140 REM ; (Note that range of I should be set to fill array,
150 REM ; and that step should be made to keep pattern clear.)
160 REM
170 REM ; First, for pattern 1
180 FOR I = -79 TO 79 STEP 4
190   FOR X = 0 TO 79
200     Y1 = FNPAT1
210     IF Y1<0 OR Y1>63 THEN GO TO 240
220     PRINTARRAY(X,Y1)=PRINTARRAY(X,Y1) + 1
230 REM DNSTY1: DON'T SET ARRAY PATTERN FOR Y1
240     PRINT "1";
250   NEXT X
260 NEXT I
270 REM
280 REM ; Next, for pattern 2
290 FOR I = -79 TO 79 STEP 4
300   FOR X = 0 TO 79
310     Y2 = FNPAT2
320     IF Y2<0 OR Y2>63 THEN GO TO 350
330     PRINTARRAY(X,Y2)=PRINTARRAY(X,Y2)+2
340 REM DNSTY2: DON'T SET ARRAY PATTERN FOR Y2
350     PRINT "2";
360   NEXT X
370 NEXT I
380 REM
390 REM ; Print the pattern
400 FOR I = 0 TO 63
410   FOR J = 0 TO 79
420     ARRELM = PRINTARRAY(J,I)
430     IF ARRELM = 0 THEN LPRINT " "; : GO TO 490
440     IF ARRELM = 3 THEN LPRINT "H"; : GO TO 490
450     IF ARRELM + PRINTARRAY(J+1,I) = 3 THEN LPRINT "J"; : GO TO 490
460     IF ARRELM + PRINTARRAY(J-1,I) = 3 THEN LPRINT "I"; : GO TO 490
470     LPRINT ".";
480 REM NEXTJ1:
490   NEXT J
500 LPRINT
510 NEXT I
520 REM
530 REM ; End this nifty program
540 SYSTEM
550 END

```

each axis. The equations in lines 44 and 46 are the generating functions, solved to determine the distance from the center; that distance is then compared against the list of bounding radii in the data statement, while a count is kept to determine the light/dark decision. The same print routine as before copies the array out to the printer.

The four patterns in Figure 2 are the output from this program. The first pattern shown gives only the zone plate overlay, accomplished by deleting lines 72 to 92 of the program. The second pattern is from the unaltered program, with a lateral offset of 10 lines. The striking

thing about zone plate patterns is that the result is a set of straight lines, which are evident even at this resolution.

The third pattern has the second zone plate offset by 10 lines and 10 columns. There are still the straight line results, but now they are tilted. The lines were close enough together that the J's associated with near intersections seemed to clutter up the picture, so I modified the print routine for the version shown in the fourth to eliminate them, and the result shows the moiré lines much more clearly.

This ended my work with character moirés, but there is plenty of opportu-



600XL CALL
800XL CALL

1050 DRIVE	\$335	MICROBITS INFC	\$78
1025 PRINTER	\$399	80 COLUMN BD	\$249
1020 COLOR PTR	\$219	TECHNICAL NOTES	\$25
1027 PRINTER	\$279	REAL TIME CLK	\$38
1010 RECORDER	\$72	48K RAM (INTEC)	\$95
64K RAM (MOAIC)	\$145	64K RAM (INTEC)	\$119
48K RAM (MOAIC)	\$109	AXIOM PRINTER INFC	\$80
MICRO PERIF. MODEM/INFC	\$129		

DRIVES

ASTRA 1620	\$469	PERCOM 40-S1	\$418
RANA 1000	\$295	PERCOM 40-S2	\$718
PERCOM 88-S1	\$298	PERCOM 44-S1	\$510

*ASTRA 1620
DISK DRIVE SYSTEM



MORE FOR YOUR MONEY
DOUBLE OR SINGLE DENSITY
TWO DRIVES

SPECIAL \$469

ATARI SOFTWARE

Saga 1-12 each (D)	\$27	Starcross (D)	\$27
Diskey (D)	\$33	Deadline (D)	\$34
Eastern Front (C/D)	\$23	Baseball (D) \$23 (R) \$23	
747 Land Sim (C/D)	\$17	Pool 1.5 (D)	\$23
Microsoft Basic II (R)	\$62	Data Perfect (D)	\$74
Atari Writer (R)	\$68	C-65 (D)	\$58
Assembler Editor (R)	\$42	Max-85 (D)	\$58
Pac Man (R)	\$30	Action (D)	\$65
Donkey Kong (R)	\$34	Ali Baba (D)	\$20
VC (D)	\$17	Softporn (D)	\$20
Legionnaire (C)	\$23	Ultima II (D)	\$39
Telegard (D)	\$19	Frogger (C/D)	\$23
Sky Blazer (D)	\$22	Wavy Navy (D)	\$23
Bank St. Writer (D)	\$46	Type Attack (D)	\$27
A.E. (D)	\$23	Snooper I or II (D)	\$30
Choplifter (D) \$23 (R) \$29		Most Amaz. Thing (D)	\$27
Serpentine (D) \$23 (R) \$29		Face Maker (D)	\$20
Text Wizard (D)	\$65	Kinder Comp (D)	\$20
Basic Compiler	\$65	Fort Apocalypse (C/D)	\$23
Zaxxon (C/D)	\$27	Pharaoh's Curse (C/D)	\$23
S.A.M. (D)	\$39	Protector II (D)	\$23
P.M. Animator (D)	\$23	Shamus (D)	\$23
Spelling Bee (D)	\$27	Blues Max (C/D)	\$23
Fractions (C) \$21 (D) \$27		Combat Leader (C/D)	\$27
Decimals (C) \$21 (D) \$27		Knight's Desert (C/D)	\$27
Jumpman (C/D)	\$27	Cosmic Balance (C/D)	\$27
Temple of APS (C/D)	\$27	Tigers In Snow (C/D)	\$27
Nightmare (D)	\$20	Miner 2049er (R)	\$34
Sargon II (C) \$20 (D) \$23		Astro Chase (D)	\$22
Suspended (D)	\$34	Financial Wizard (D)	\$41
Zork I, II or III (D)	\$27		
Q-BERT	\$33		
POPEYE	\$33		

SPECIALS

Gemini 15X Printer	\$399
Axiom AT-100 Printer (with interface)	\$229
Astra Double Density Dual Drive	\$469
Rana 1000 Drive	\$319
Bit-3 80 Column Board	\$245
Mannesmann Talley 160L Printer	\$589
Atari 400 Keyboard (In Home)	\$35
Programmer Kit	\$48
Entertainer Kit	\$64
Wico Joystick	\$49
Wico Trackball	\$49

COMMODORE

1541 DISK DRIVE \$239

1701 Color Monitor	\$255	1530 Recorder	\$59
1525 Printer	\$239	1600 Modem	\$59
1520 Color Ptr	\$169	1650 Auto Modem	\$158

64 SOFTWARE 64

Neutral Zone (C/D)	\$26	Fort Apocalypse (C/D)	\$23
Sprite Master (D)	\$27	Pharaoh's Curse (C/D)	\$23
Computer Football (C)	\$18	Protector II (D)	\$23
Telegard (C)	\$16	Shamus (D)	\$23
Choplifter (R)	\$29	Nukewar (C)	\$12
Temple of Apsai (D)	\$27	Midway Campaign (C)	\$12
Jumpman (C/D)	\$27	Paper Clip (D)	\$89
Crush Crumble (D)	\$20	Delphis Oracle (D)	\$114
Gridrunner (R)	\$27	Word Pro 3 + Jw Spell	\$139
Zork I, II or III (D)	\$27	Video Pak 80	\$139
Deadline (D)	\$35	Script 64 (D)	\$77
Starcross (D)	\$27	Calc Result Prof (D)	\$119
Frogger (C/D)	\$23	Home Accountant (D)	\$48
Type Attack (D)	\$27	M-File (D)	\$89
Face Maker (D)	\$23	Quick Brown Fox (R)	\$50
Kindercomp (D)	\$20	Writers Assistant (D)	\$95
Hey Diddle (D)	\$20	Spreadsheet Assist. (D)	\$95
Most Amaz. Thing (D)	\$27	File Assistant (D)	\$95
		Hesmon 64 (R)	\$27

APPLE HARDWARE

A.L.S.		M&R	
CPM Card	\$278	Super Fan	\$38
Z Card II	\$119	MICROSOFT	
Color II	\$129	Softcard	\$228
Smarter II	\$129	Softcard Plus	\$418
ALIEN GROUP		Softcard Premium II	\$329
Apple Voice Box	\$128	Softcard Premium II	\$459
Atari Voice Box	\$98	ORANGE MICRO	
INTERACTIVE STRUC.		Grappier +	\$115
Phaso Interface	\$127	Buffered Grappier	Call
KENSINGTON		RH ELECTRONICS	
System Saver	\$64	Super Fan II	\$59
KOALA TECHNOLOGIES		TG PRODUCTS	
Apple Graphic Tablet	\$79	Joystick II w/Toggle	\$41
Atari Graphic Tablet	\$69	Joystick	\$41
C-64 Graphic Tablet	\$69	Paddles	\$29
KRAFT		TYMAC	
Joystick	\$40	Printer Interface	\$74
Paddles	\$35		

apple IIe

64K SYSTEM . LIST \$1995

CALL FOR LOW PRICE
APPLE DRIVES

MICRO-SCI		RANA	
A2 Drive	\$229	Elite I Drive	\$259
A40 Drive	\$269	Elite II Drive	\$444
A70 Drive	\$349	Elite III Drive	\$549
Drive Controller	\$74	Drive Controller	\$89

Printers/Etc.

GEMINI 10X	\$279	PROWRITER	\$345
GORILLA	\$199	SMITH TPI	\$488
CITON		SILVER REED P	\$669
Prowriter	\$345	QUME 11/40 +	\$1299
Prowriter II	\$629	OKI-DATA	
Starwriter	\$1149	Microline 82A	\$398
Printmaster	\$1448	Microline 83A	\$638
NEC		Microline 84P	\$958
8023 A-C	\$409	Microline 92	\$488
3510	\$1375	Microline 93	\$858
3530	\$1579	DIABLO	
3550	\$1779	620R	\$939
7710/7730	\$1998	630R	\$1719

MONITORS

AMDEK		NEC	
Color I	\$289	GRN (JB1260)	\$115
V300	\$139	GRN (JB1201)	\$155
V300A	\$149	Color Composite	\$298
Color II	\$449	RGB Color	\$598

MODEMS

HAYES	
Smartmodem	\$209
Smartmodem 1200	\$498
Microcommod II	\$259
NOVATION	
J-Cat	\$99
Apple Cat II	\$259
D-Cat	\$149



COSMIC
COMPUTERS

UNLIMITED

727 BREA CANYON RD., SUITE 16
WALNUT, CA 91789

ORDER LINES OPEN MON-SAT 8 am - 6 pm

(800) 626-7642

PLEASE FOR ORDERS ONLY
SORRY, NO COD'S

(714) 594-5204

FOR TECHNICAL INFO, ORDER INQUIRIES,
OR FOR CALIFORNIA ORDERS

Add \$2.50 shipping per software order in continental U.S. Add \$5.00 shipping per software order for AK, HI, FPO-APO. Add \$10.00 or 15% (whichever is greater) per software order for non-U.S. Call for cost of hardware shipping. Calif. residents add 6 1/2% sales tax. Cashiers checks or money orders filled within 24 hours for items in stock. Personal checks require 4 weeks to clear. MasterCard and Visa OK for software only within continental U.S. add 3% surcharge. Include card no., expiration date and signature. Due to our low prices, all sales are final. All defective returns must have a return authorization number. Please call to obtain one before returning goods for replacement or repair. Prices & availability subject to change.



SOFTWARE

APPLE COMPUTER INC.		ON-LINE	
Apple Writer IIe	\$157	The Dictionary	\$65
ARTSCI		Sammy Lightfoot	\$20
Magic Window II	\$95	General Manager II	\$145
Magic Words	\$45	Screenwriter II	\$80
ASHTON TATE		Wiz & Princess	\$22
D Base II (Req Z-80)	\$299	Mystery House	\$17
Finan. Plan. (Req Z-80)	\$399	Time Zone	\$65
Friday	\$198	Maurauder	\$23
AVALON HILL		Frogger	\$23
Telegard	\$19	Cannonball Blitz	\$23
VC	\$17	Screenwriter Prof.	\$128
Empire of Overmind	\$23	PENGUIN	
AVANT GARDE		Spy's Demise	\$14
Zero Grav. Pinball	\$20	Graphic Magician	\$39
Hi-Res Golf	\$20	Comp. Graphics Sys.	\$39
Hi-Res Secrets	\$79	Special Effects	\$27
BEAGLE BROS.		PLATO	
Dos Bos	\$17	Whole Numbers	\$38
Alpha Plot	\$27	Decimals	\$38
Utility City	\$20	Fractions	\$38
Tip Disk #	\$15	QUALITY	
Apple Mechanic	\$20	Bag of Tricks	\$27
Pronto Dos	\$20	Ali Baba & 40 Thieves	\$22
Flex Text	\$20	SENSIBLE SOFTWARE	
Frame Up	\$20	Sensible Speller	\$79
Type Faces	\$14	Super Disk Copy III	\$23
BRODERBUND		Multi Disk Catalog	\$17
Bank St. Writer	\$45	SILICON VALLEY	
AE	\$23	Word Handler	\$128
Serpentine	\$23	List Handler	\$59
Choplifter	\$23	SIRIUS	
Star Blazer	\$22	Kabul Spy	\$23
David's Midnight	\$23	Bandits	\$23
Apple Panic	\$20	Type Attack	\$27
Alien Rain	\$17	Repton	\$27
Arcade Machine	\$41	Critical Mass	\$27
BPI		Beer Run	\$20
General Acct.	\$275	SIR TECH	
A/R	\$275	Police Artist	\$23
A/P	\$275	Wizardry	\$34
CONTINENTAL		Knight of Dia.	\$23
G/L, A/R, A/P or P/R	\$159	SOFTWARE PUBLISH.	
Property Mgt.	\$296	PFS: Report	\$79
Home Accountant	\$48	PFS: Filing	\$79
1st Class Mail	\$48	PFS: Graph	\$79
DATAMOST		SORCIM	
Aztec	\$27	Supercalc (Req. Z-80)	\$124
Tubeway	\$23	Spellguard (Req. Z-80)	\$124
Snack Attack	\$21	SOUTHEASTERN	
Swashbuckle	\$25	Data Capture 4.0	\$46
DATASOFT		Data Capture 4.0/80	\$59
Zaxxon	\$27	SPINNAKER	
Micropainter	\$23	Delta Drawing	\$34
DON'T ASK		Hey Diddle	\$20
SAM (w/DAC)	\$79	Most Amazing Thing	\$27
Wordrace	\$17	Snooper Troops #1	\$29
EDUWARE		Snooper Troops #2	\$29
Alg 5 & 6	\$34	Story Machine	\$23
Empire II	\$20	Face Maker	\$23
Fractions	\$34	STONEWARE	
Decimals	\$34	Graphic Sys. (Prof.)	\$116
Spelling Bee w/Read	\$27	D.B. Master	\$148
Alg. 1, 2, 3 or 4	\$27	D.B. Master Util. #1	\$84
Rendezvous	\$27	Graphics Proc. Sys.	\$46
Prisoner II	\$23	STRATEGIC SIMULATIONS	
EPYX		Battle of Normandy	\$27
Temple of APS	\$27	Germany 1985	\$39
Tuesday Quarterback	\$20	Epidemic	\$23
Crush Crumble	\$20	Pursuit Graf Spree	\$39
HAYDEN SOFTWARE		Shattered Alliance	\$39
Sargon II	\$25	Fighter Command	\$39
Piewriter 2.2	\$95	S.E.U.I.S.	\$27
INFOCOM		Computer Baseball	\$27
Suspended	\$34	Cytron Masters	\$27
Zork I, II or III	\$27	Guadalcanal	\$39
Starcross	\$27	Galactic Gladiators	\$27
Deadline	\$34	Battle of Shiloh	\$27
INSOFT		Tigers In Snow	\$27
Graforth II	\$50	Cosmic Balance	\$27
Electric Duet	\$20	Computer Qtrback	\$27
IUS		SUBLOGIC	
Prof. Easywriter	\$114	Whole Brain Spelling	\$23
Original Easywriter	\$65	Flight Simulator	\$24
Original Easywriter	\$45	Space Viking	\$34
LEARNING COMPANY		Saturn Navigator	\$23
Juggles' Rainbow	\$20	SYNAPSE	
Bumble Games	\$27	Protector II	\$23
Bumble Plot	\$27	Shamus	\$23
Gertrudes Secrets	\$30	Pharaoh's Curse	\$23
Gertrudes Puzzles	\$30	SYNERGISTIC	
Rocky Boots	\$34	Atlantis	\$28
LJK		Global Prog. Line Ed.	\$44
Letter Perfect	\$89	TARRAPIN	
LOTUS		Terrapin Logo (64K)	\$99
Exec. Brief Sys.	\$125	VISICORP	
MICROLAB		Visicalc IIe	\$164
Miner 2049er	\$27	Visicalc 3.3	\$158
Data Factory 5.0	\$189	Visifile	\$165
Payroll Manager	\$189	Visidex	\$165
MICROSOFT		Visipilot	\$139
Typing Tutor II	\$117	Visitrend/Plot	\$195
Applesoft Compiler	\$118	Visi Schedule	\$195
A.L.D.S. (Req Z-80)	\$79	MISCELLANEOUS	
Basic Compiler	\$239	Millionaire	\$39
Multiplan	\$169	Pinball Const. Set	\$27
Olympic Decathlon	\$20	Pool 5	\$23
MUSE		Bandits	\$23
Robot	\$27	Human Fly	\$21
Castle Wolfenstein	\$20	Master Type	\$27
ODESTA		New Step by Step	\$57
Chess	\$45	Ultima	\$27
		Zoom Graphics	\$34

Moiré, continued...

nity for other generating functions and criteria, and I have shown you two different ways to fill the print array. On now, to more dense dot matrix patterns.

Dot Matrix Displays

I had available three means to try for higher resolution moiré patterns. First, I used the dot graphic capability of my printer, using the same programming procedures that I have already described. Second, under TBasic on my computer there is a set of graphics commands that makes circles, ellipses, and line segments very simply. These commands are essentially identical to the set provided with the IBM PC Basic. Third, I had access to a Vectrix VX384 controlled by a Kaypro II, which allowed me to check out a little of what my reference said about color illusions associated with moiré patterns.

For the graphics printer, I used essentially the same approach as for the character patterns. However, the

Figure 2. Zone plate patterns. 2A shows a single zone plate. 2B shows two with offset of 10 lines. 2C shows two with offset of 10 lines and 10 columns. 2D is the same as 2C but with || pairs suppressed.



In 2A, lines 72 to 92 are deleted from Listing 3.

Listing 3.

```

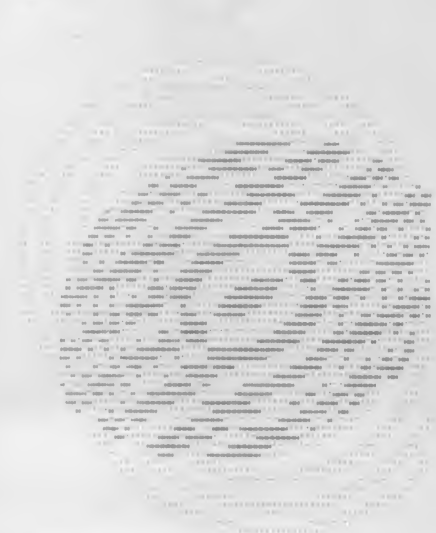
10 DIM PRINTARRAY(79,63)
20 DATA 12.62,17.84,21.85,25.23,28.21,30.9,33.38,35.68,37.85,39.89
25 B = 10
30 FOR I=0 TO 63 : FOR J=0 TO 79
40 XC1 = J - 39 + B : YC1 = I - 31
42 XC2 = J - 39 : YC2 = I - 31 - B
43 YC1 = 1.6666*YC1 : YC2 = 1.6666*YC2
44 RC1 = SQR(XC1*XC1 + YC1*YC1)
46 RC2 = SQR(XC2*XC2 + YC2*YC2)
50 RESTORE 20
52 FOR K = 1 TO 10
54 READ RNEXT
56 IF RNEXT < RC1 THEN GOTO 70
58 IF K MOD 2 = 1 THEN INSERT = 1 ELSE INSERT = 4
60 PRINTARRAY(J,I)=INSERT
62 K=11
70 NEXT K
72 RESTORE 20
74 FOR K = 1 TO 10
76 READ RNEXT
78 IF RNEXT < RC2 THEN GOTO 92
80 IF K MOD 2 = 1 THEN INSERT = 2 ELSE INSERT = 8
82 PRINTARRAY(J,I)=PRINTARRAY(J,I)+INSERT
84 K=11
92 NEXT K
168 NEXT J: NEXT I
170 FOR I = 0 TO 63
180 FOR J = 1 TO 78
190 ARREL = PRINTARRAY(J,I)
200 IF ARREL = 0 THEN LPRINT " " : GOTO 230
205 IF ARREL = 4 THEN LPRINT " " : GOTO 230
206 IF ARREL = 8 THEN LPRINT " " : GOTO 230
210 IF ARREL = 3 THEN LPRINT "H" : GOTO 230
211 IF ARREL = 12 THEN LPRINT "H" : GOTO 230
220 IF ARREL+PRINTARRAY(J+1,I) = 3 THEN LPRINT "]": GOTO 230
221 IF ARREL+PRINTARRAY(J-1,I) = 3 THEN LPRINT "[": GOTO 230
222 IF ARREL + PRINTARRAY(J+1,I) = 12 THEN LPRINT "]": GOTO 230
223 IF ARREL + PRINTARRAY(J-1,I) = 12 THEN LPRINT "[": GOTO 230
225 LPRINT ".";
230 NEXT J
240 LPRINT
250 NEXT I
260 END
300 FOR A = 500 TO 5000 STEP 500
310 R = SQR(A/3.14159)
320 LPRINT R
330 NEXT A

```

In 2B, 40 XC1 = J - 39 : YC1 = I - 31



2C.



In 2D, 40 XC1 = J - 39 - B : YC1 = I - 31
delete lines 220 through 223

Moiré, continued...

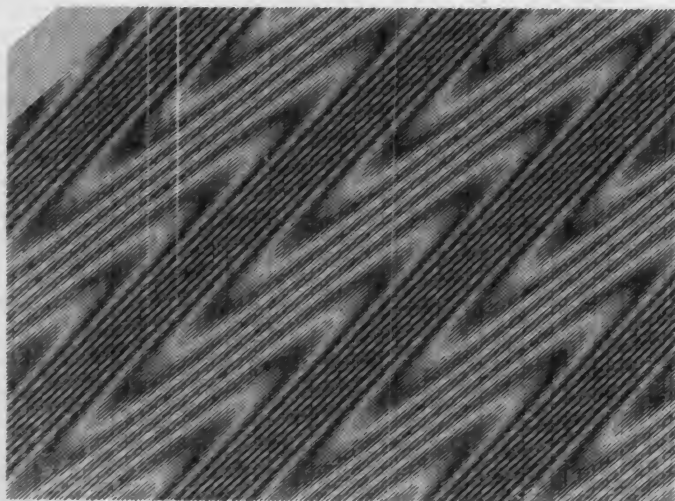
amount of memory required to hold an entire page in advance of printing is phenomenal (72 x 160 dots per inch). Consequently, I modified the print array to be only a single line of graphics print, 8 dots high by 1280 dots wide. The X-Y axes are effectively swapped, so that

each 1280-dot line corresponds to a single X value of the generating function. The final program is shown in Listing 2. Added at the beginning of the program now is an assembly code routine that sends individual characters to the printer. This is because my MBasic patiently counts everything sent to the printer and inserts a carriage

return and linefeed after every 132 characters, whether you like it or not. Your Basic may or may not do this, but with lines 1280 characters long, it was plain annoying.

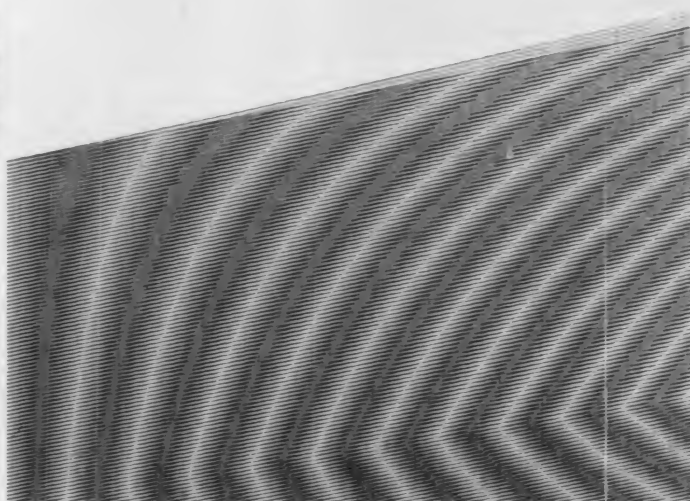
This particular program generated the example in Figure 1. Figure 3 shows four additional examples, again showing

Figure 3. Four additional dot matrix moiré patterns.



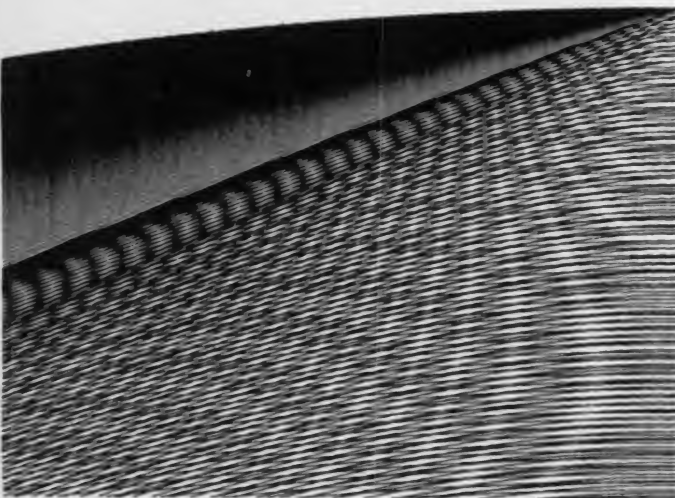
3A

```
340 DEF FNPAT1 = 2*X - J
350 DEF FNPAT2 = 2.1*X - J
381 I = -1280
382 J = -1280
400 (deleted)
561 J = J + 10
562 I = I + 10 + 3*SIN(I/100)
563 IF I < 1280 THEN GO TO 420
580 (deleted)
```



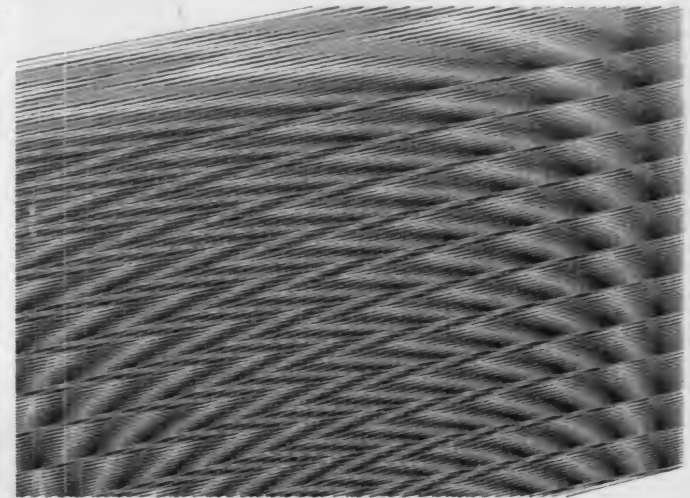
3B

```
340 DEF FNPAT1 = X/2 - I
350 DEF FNPAT2 = X/(2.8 - ABS(.8*I/1279)) - I
```



3C

```
340 DEF FNPAT1 = SQR(X*X + I*I) - I
350 DEF FNPAT2 = SQR(X*X + ABS(I)^2.3) - I
400 FOR I = -880 TO 2000 STEP 10
```



3D

```
340 DEF FNPAT1 = X/(2 + .3*(SIN(I/880))) - I
350 DEF FNPAT2 = X/2.25 - I
381 SI = 10
382 I = -1200
400 SI = 10 + 4*SIN((I/10 MOD 10)/10)
580 (deleted)
581 I = I + SI
582 IF I < 200 THEN GO TO 400
```


the lines changed from the origin program in Listing 2. The first pattern is the traditional wetted silk look. The generating functions give simple parallel straight lines, each set with a slightly different slope (2.1 and 2), but with the spacing of one set controlled as a function of the index.

The second pattern has one set of lines with variable slope involving an absolute value, thus putting an interesting series of corners in the resultant pattern. The third is generated with some pythagorean promises and deserves a title.

The last pattern is made from a generating pattern with variable slope, as well as with spacing that is a function of the index. Note in those two programs with variable steps, that I had to rewrite the FOR I loop, since my MBasic would not recognize recalculation of the STEP size once the loop was started.

I should point out that these patterns take from one to five hours per page to print, depending on the complications of the generating functions and the range and step of the generating index.

Figure 4 shows a pattern that didn't work very well and a pattern that shouldn't have worked at all, but did. The first one was an attempt to recreate the visual effect I often see driving on the freeway, looking through the two chain-link fences on pedestrian overcrossings. The fence wires are too fine for me to see, but I can often see a moiré pattern, and it is always diamonds, just like the generating overlay.

In the printed pattern of Figure 4A, two sets of squares overlay, one set only slightly smaller than the other. The resultant square (actually, double square) pattern can be discerned, but it is not as exciting as I had hoped. The reason it didn't turn out well, I believe, was that I could not print real squares of two different sizes on my printer given the resolutions 160 and 72, the quotient of which is not integral.

The other pattern in Figure 4B is a fluke. I did two dumb things that turned out as you see. The first thing was to make the generating functions both give straight lines with the same slope, but with the interline spacing of one set variable with the index. Without the other change, this would have resulted in the wholly uninteresting arrangement of which just a snatch is shown in Figure 4C. But I wasn't satisfied, at the time with the horrendous length of time that each print was taking, and I executed my very good idea of limiting the index values to just those of use in a particular X line.

This required solving the generating equations for I with $Y=0$ and $Y=1280$. Then the index could be merely stepped

Listing 2. The dot matrix moiré program with all comments. The generating functions are at lines 340 and 350, and the family generating loop is at line 800. The leading USR pokes and definition set up an assembly subroutine to overcome MBasic line length limit.

```

10 REM ; HRMOIR1.BSC 8-5-83 MARK GARDNER
20 REM ; PROGRAM TO USE HIGH RESOLUTION 8 BIT GRAPHICS OF PROWRITER
30 REM ; TO MAKE MOIRE PATTERNS.
40 REM
50 REM ; Establish assembly list output routine
60 REM ; ;DE POINTS TO C# DESCRIPTOR
70 REM ; INX D ;POINT TO SECOND BYTE
80 REM ; LDAX D ;PICK UP LSB OF CHAR POINTER
90 REM ; MOV L,A ;AND PUT IN HL REGISTER
100 REM ; INX D ;POINT TO THIRD BYTE
110 REM ; LDAX D ;PICK UP MSB OF CHAR POINTER
120 REM ; MOV H,A ;AND PUT IN HL REGISTER
130 REM ; MOV E,M ;PUT CHARACTER INTO E REGISTER
140 REM ; MVI C,5 ;ESTABLISH LIST OUT FUNCTION
150 REM ; JMP 5 ;AND TURN CONTROL TO BDOS
160 REM
170 REM OUTPRG: OUTPUT PROGRAM
180 DATA 19,26,111,19,26,103,94,14,5,195,5,0
190 RESTORE 180
200 FOR I = 0 TO 11
210 READ XX
220 POKE &H40+I,XX
230 NEXT I
240 DEF USR 0 = &H40
250 REM
260 REM ; Put printer in high density mode, compress line advance
270 LPRINT CHR$(27)+"P"+CHR$(27)+"T16";
280 REM
290 REM ; Establish array used for each line of printing
300 REM ; Note, this is the Y dimension
310 DIM DOTS$(1279)
320 REM
330 REM ; Establish the defining functions for the family of curves
340 DEF FNPAT1 = X/2.25 - I
350 DEF FNPAT2 = X/(2 + .3*(SIN(1/880))) - I
360 REM
370 REM ; For each line on the page (144 dpi, 14 dpl, 11 inches)
380 FOR L = 0 TO 95
390 REM ; For each increment of the family generator
400 FOR I = -880 TO 880 STEP 10
410 REM ; For each X value on the current line
420 MASKSET = -1
430 FOR X = L*8 TO L*8+7
440 MASKSET=MASKSET+1
450 MASK=2^MASKSET
460 REM ; Set the appropriate Y bits
470 Y1 = INT(FNPAT1)
480 IF Y1<0 OR Y1>1279 THEN GO TO 510
490 DOTS$(Y1)=DOTS$(Y1) OR MASK
500 REM NEXT Y:
510 Y2 = INT(FNPAT2)
520 IF Y2<0 OR Y2>1279 THEN GO TO 560
530 DOTS$(Y2)=DOTS$(Y2) OR MASK
540 REM ; Next X
550 REM NEXT X:
560 NEXT X
570 REM ; Next family generator step
580 NEXT I
590 REM
600 REM ; Clear the last few graphics bytes for printer
610 FOR I = 1275 TO 1279
620 DOTS$(I) = 0
630 NEXT I
640 REM ; Print the graphics line
650 LPRINT CHR$(27)+"S1279"
660 FOR I = 0 TO 1278
670 A$ = USR0 (CHR$(DOTS$(I)))
680 DOTS$(I) = 0 'CLEAR LINE WHILE WE'RE AT IT
690 NEXT I
700 REM ; Next line
710 LPRINT
720 NEXT L
730 END

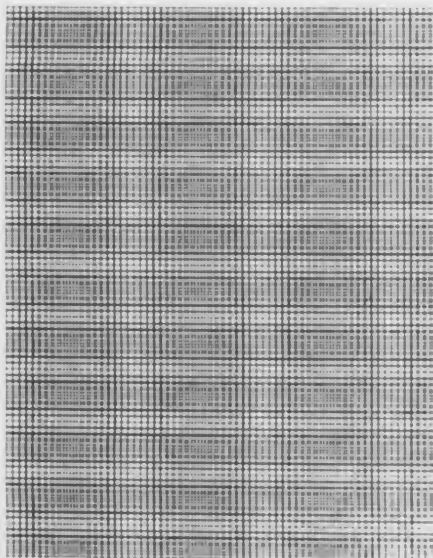
```


Moiré, continued...

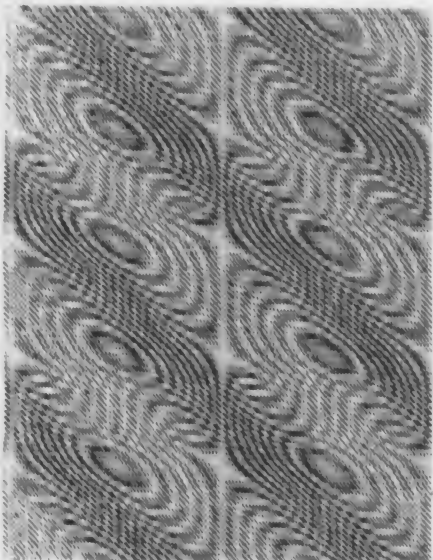
between the determined limits. This worked fine, but the initial limit was not always a nice round number as it was when simply set in the DO loop. Hence, each 8-bit wide print line contains pieces of different family members different from the ones on either side. The lines in this pattern are all parallel; there is not a

Figure 4. Two patterns, one not-so-good that should have turned out, and a great one that shouldn't have turned out (and which may not be a moiré pattern). 4A shows overlays of squares of two different sizes. 4B is composed of portions of parallel lines with variable spacing, as shown in the (AB) interstice.

4A



4B



single intersection on the printout; yet you see the striking pattern.

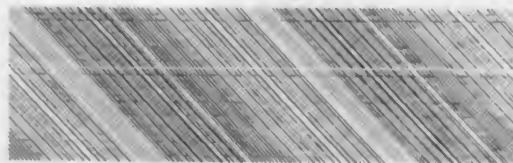
Zone plates in this high-resolution mode also required changes. The brute force approach would take forever—every line would require 10,000 times through the loop. So, I designed the program shown in Listing 4 to determine by direct calculation the points on each line that were boundaries of the equal-area rings. Then, it was much faster and easier to fill in between pairs of boundaries. The first pattern in Figure 5, a zone plate, was printed with this approach in about 45 minutes. I was able to take advantage of the higher resolution and put nearly five times as many rings as for the character-based zone plate. There is a little bug evident near the bottom of the pattern. It was not obtrusive, so I

didn't attack it; no doubt it relates to ordering of the ring boundaries in the YPOINTS array.

The first pattern by itself can be used to create an optical illusion of a moiré, that is, an illusion of an illusion. In moderate light, view the single zone plate, then move the image sideways or tilt it. You will see, or seem to see, motion along the lines of the zone plate. This is a moiré forming on your retina from the current image and the latent image. This also works well with radial line patterns.

In the second pattern of Figure 5, I have simply printed the second zone plate on top of the first by repositioning the paper (this saved enlarging the program, as I did for the previous approach). The resultant straight line pattern is obvious and well defined. The

4C



Listing 4. Program to make high-resolution zone plates. Seed radius is entered in line 390.

```

10 REM ; HRMOIR3.BSC 8-5-83 MARK GARDNER
20 REM ; PROGRAM TO USE HIGH RESOLUTION 8 BIT GRAPHICS OF PROWRITER
30 REM ; TO MAKE MOIRE PATTERNS. THIS PARTICULAR VERSION ORIGINATED
40 REM ; TO ATTEMPT A ZONE PLATE PATTERN
50 REM
60 REM ; Establish assembly list output routine
70 REM ; ;DE POINTS TO C* DESCRIPTOR
80 REM ; INX D ;POINT TO SECOND BYTE
90 REM ; LDAX D ;PICK UP LSB OF CHAR POINTER
100 REM ; MOV L,A ;AND PUT IN HL REGISTER
110 REM ; INX D ;POINT TO THIRD BYTE
120 REM ; LDAX D ;PICK UP MSB OF CHAR POINTER
130 REM ; MOV H,A ;AND PUT IN HL REGISTER
140 REM ; MOV E,M ;PUT CHARACTER INTO E REGISTER
150 REM ; MVI C,5 ;ESTABLISH LIST OUT FUNCTION
160 REM ; JMP 5 ;AND TURN CONTROL TO BDOS
170 REM
180 REM OUTPRG: OUTPUT PROGRAM
190 DATA 19,26,111,19,26,103,94,14,5,195,5,0
200 RESTORE 190
210 FOR I = 0 TO 11
220 READ XX
230 POKE &H40+I,XX
240 NEXT I
250 DEF USR 0 = &H40
260 REM
270 REM ; Put printer in high density mode, compress line advance
280 LPRINT CHR$(27)+"P"+CHR$(27)+"T16";
290 REM
300 REM ; Establish array used for each line of printing
310 REM ; Note, this is the Y dimension
320 DIM DOT$(1279)
330 REM ; Establish YPOINTS array for horizontal line filling
340 DIM YPOINTS(100)
350 DIM RADIUS(50)
360 REM ; Establish the defining parameters for the zone plates
370 REM ; (Set a 'seed' for generation. Seed is radius of center circle
380 RSEED = 91 'DETERMINED BY EXPERIMENTATION
390 ASEED = (RSEED^2)*3.14159
400 FOR I = 0 TO 50
410 RADIUS(I) = SQR((I+1)*ASEED/3.14159)
420 PRINT "RADIUS("I") = " RADIUS(I)

```

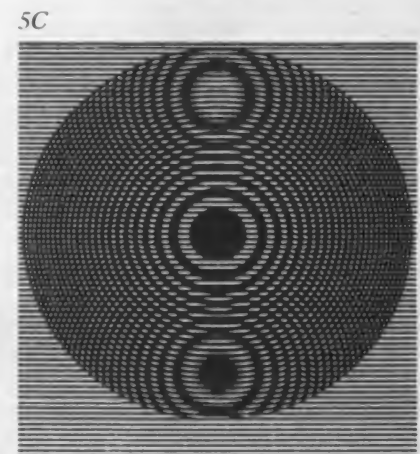
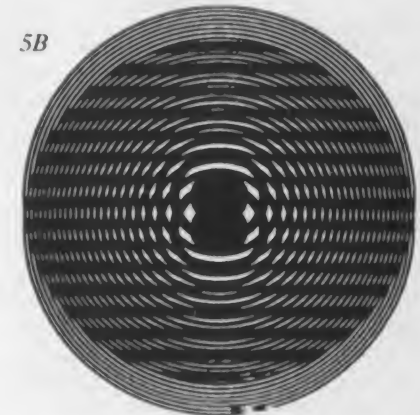
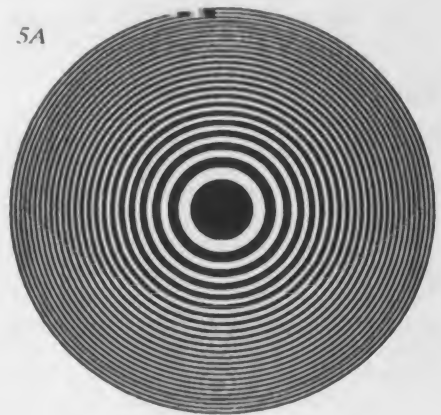


```

430 IF RADIUS(I) > 625 THEN GO TO 460
440 NEXT I
450 REM NOMORR: NO MORE RADII, THANK YOU
460 RINDX = I-1
470 YPMID = 50
480 PRINT "MAX RADIUS INDEX ="RINDX
490 REM
500 REM ; (OFFSET FOR SECOND ZONE PLATE)
510 BX = 30 : BY = 0
520 REM ; (CENTER OF FIRST ZONE PLATE)
530 CX = 750 : CY = 640
540 REM ; (INVERSE EQUATIONS SOLVING FOR Y)
550 DEF FNZONEY = SQR(R*R - XX*XX)
560 DEF FNDIST = R*R - XX*XX
570 REM
580 REM ; For each line on the page (144 dpi, 16 dpl, 11 inches)
590 FOR L = 0 TO 95
600 PRINT "L";
610 REM
620 REM ; For each dot line in the group of 8 per printed line
630 REM ; Setup for masking it
640 MASKSET = -1
650 GOTDATA = 0
660 FOR X = L*8 TO L*8+7
670 PRINT "X";
680 MASKSET = MASKSET + 1
690 MASK = 2^MASKSET
700 REM ; Clear the YPOINT array
710 FOR I = 0 TO RINDX*2
720 YPOINTS(I) = 0
730 NEXT I
740 REM
750 REM ; Calculate the Y edges for zone intersection with X line
760 XX = 1.111111*ABS(CX - 2*X)
770 FOR I = 0 TO RINDX
780 PRINT "R";
790 R = RADIUS(I)
800 RADSQR = FNDIST
810 IF RADSQR < 0 THEN GOTO 900
820 Y = SQR(RADSQR) 'IN LIEU OF USING THE FUNCTION
830 IF Y > 639 THEN GO TO 900
840 REM
850 REM ; Store those Y edges for later masking to set
860 YPOINTS(YPMID-I)=CY-Y : YPOINTS(YPMID+I+1) = CY+Y
870 REM ; Set the got-data flag
880 GOTDATA = 1
890 REM NEXT I:
900 NEXT I
910 REM
920 REM ; Set the bits between appropriate pairs of YPOINTS
930 FOR I = 50-RINDX-1 TO 50+RINDX
940 PRINT "Y";
950 IF YPOINTS(I) = 0 THEN GO TO 1080
960 POINT1 = YPOINTS(I)
970 FOR J = I+1 TO 50+RINDX+1
980 IF YPOINTS(J) = 0 THEN GO TO 1060
990 POINT2 = YPOINTS(J)
1000 FOR K = POINT1 TO POINT2
1010 DOTS%(K) = DOTS%(K) OR MASK
1020 NEXT K
1030 I = J
1040 J = 101
1050 REM NEXT J:
1060 NEXT J
1070 REM NEXT I:
1080 NEXT I
1090 NEXT X
1100 REM
1110 REM PRINTL:
1120 PRINT
1130 REM ; If there is any new data in the line
1140 IF GOTDATA = 0 THEN GO TO 1300
1150 REM ; Print the graphics line
1160 PRINT "SENDING TO PRINTER"
1170 PRINT
1180 LPRINT CHR$(27)+"S1278";
1190 FOR I=1270 TO 1279
1200 DOTS%(I) = 0 'NULL CHARACTERS FOR PRINTER OVERRUNS
1210 NEXT I
1220 REM
1230 FOR I = 0 TO 1277
1240 A$ = USR0 (CHR$(DOTS%(I)))
1250 DOTS%(I) = 0 'CLEAR LINE WHILE WE'RE AT IT
1260 NEXT I
1270 REM ; Else
1280 REM ; Just advance to the next line
1290 REM ADVANC: ADVANCE THE PRINTER TO NEXT LINE
1300 LPRINT
1310 REM ; End if (If there is new data)
1320 NEXT L
1330 END

```

Figure 5. High-resolution zone plate patterns. 5A shows zone plate alone, which can create retinal illusion. 5B shows straight line moiré patterns resulting from offset of two overlays. 5C shows zone plate replication when zone plate is overlaid with straight lines.



Moiré, continued...

last pattern shows a zone plate overlaid with simple straight lines. Amazingly, the moiré pattern that results is a multiple replication of the zone plate.

This concluded my work with the high-resolution printer, except as described below. I moved on to screen based graphics with Basic graphics commands, which draws circles much, much faster, and so made experimentation much easier.

Basic Graphics Command

My Toshiba T100 has an alternate operating/programming system called TBasic. It boots directly from disk and is similar to an Atari or Commodore that has only Basic available. It is really an evil environment in which to work, compared to CP/M and MBasic, but since TBasic has some useful graphics commands, I thought it would be interesting to try a few things with it. It was certainly faster; in the previous approaches it was necessary to calculate individual pixels on lines and curves. The graphics commands take care of all of that automatically.

I have included the individual programs with each of the patterns I generated under TBasic. None are commented, because TBasic provides no nice development tools for programs. With CP/M I use *WordStar* to write programs; a processing program turns these into Basic programs with or without the source file comments. This makes program writing much easier and encourages comments. None of these tools is available under TBasic. The article text will explain as little as necessary.

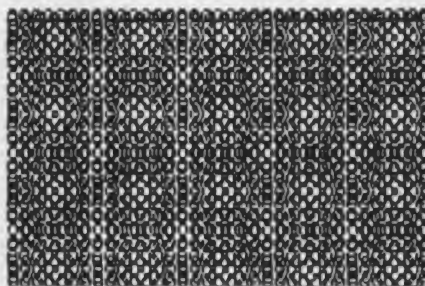
Getting the generated patterns printed is extremely easy. In TBasic, the COPY key on the computer keyboard is active and prints the screen image directly to the printer. All that is necessary is to

provide some control to overcome the dimension squishing that the print operation causes. This can be done in two ways: put the printer in high resolution (160 dots per inch), which makes circles on the screen print as circles on the printer, though the whole screen image then occupies only about half the page width; or, plot ellipses on the screen, narrow vertically, which then get pulled out to circles when printed at the normal 80 dots per inch.

The patterns in Figure 6 are printed at 80 dots per inch. The first is akin to the fence problem I tried with the printer in graphics mode, except the overlays are a dense pattern of small, adjacent circles, with a smaller center to center spacing

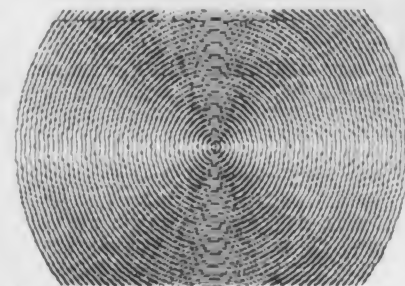
in the second set. A pattern of circles should emerge. To some extent it does, but again it is not as striking as one would like. The remaining patterns in Figure 6 show an untrodden path. I decided to see what would happen if spirals were overlaid. Pattern 6B shows two simple spirals (radius a linear function of angle) overlaid, one clockwise, and one counter-clockwise. The program for this has an interesting complication. As the calculated elements got further from the center, the initial one-degree angle step was too big, and there were gaps in the lines. Hence, the three groupings shown allow the step to be changed to one-half and then one-quarter degree as the spiral reaches its larger radii.

Figure 6. Four high-resolution moiré patterns printed at 80 dots per inch. 6A shows overlapping arrays of small circles. 6B, 6C, 6D are a new adventure with spirals.



6A

```
1 CLS
2 SCREEN 2
10 FOR I = 1 TO 37
20 FOR J = 1 TO 27
30 CIRCLE (7*I,6*J),2,,,1.03
50 NEXT J
60 NEXT I
110 FOR I = 1 TO 43
120 FOR J = 1 TO 32
130 CIRCLE (6*I,5*J),2,,,1.03
150 NEXT J
160 NEXT I
```



6B

```
10 ML = 1
20 SCREEN 2
30 CLS
40 S1 = 2*3.14159/360
50 FOR AN = 0 TO 15*2*3.14159 STEP S1
60 GOSUB 210
70 NEXT AN
80 S1 = S1/2
90 ML = ML/2
100 NL = 16*2*3.14159
110 FOR AN = NL TO 30*2*3.14159 STEP S1
120 GOSUB 210
130 NEXT AN
140 S1 = S1/2
150 ML = ML/2
160 NL = 31*2*3.14159
170 FOR AN = NL TO 45*2*3.14159 STEP S1
180 GOSUB 210
190 NEXT AN
200 END
210 RD = RD + ML*.01
220 RS = RD*SIN(AN)
230 RC = RD*COS(AN)
240 X = 320 + RS
250 Y = 100 + RC
260 W = 320 + RS
270 Z = 100 - RC
280 PSET (X,Y)
290 PSET (W,Z)
300 RETURN
```



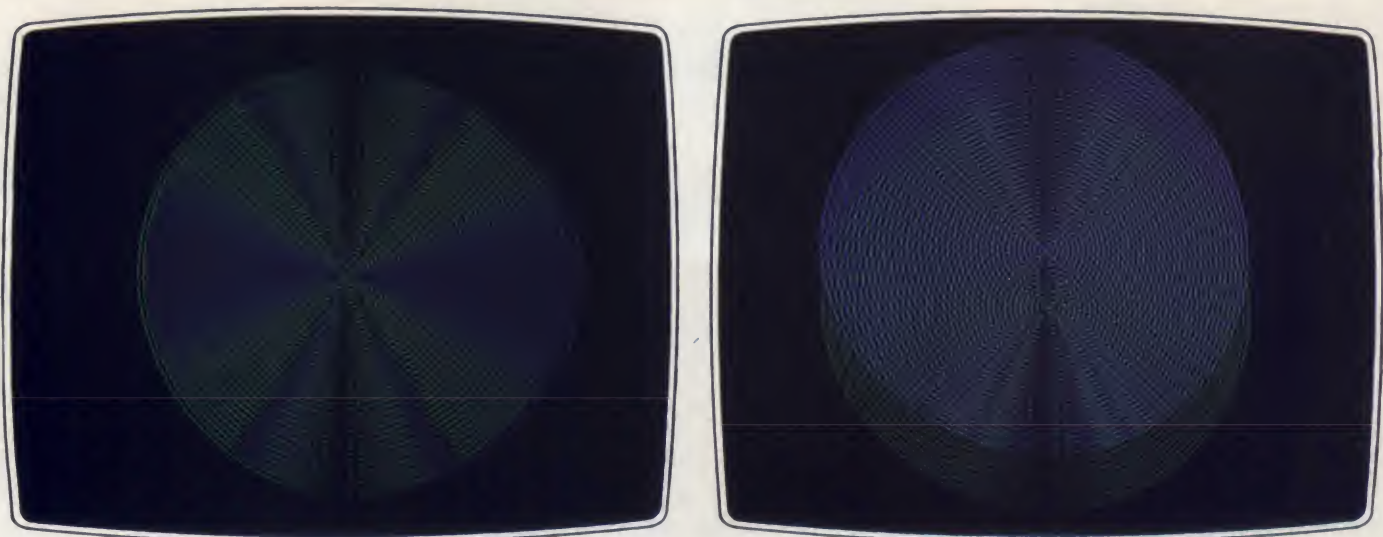
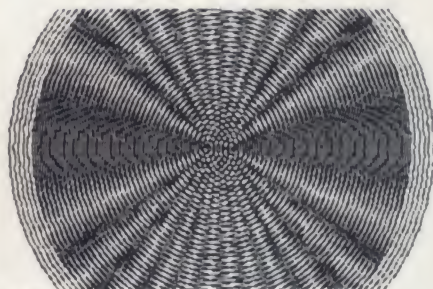


Figure 7. Two high-resolution moiré patterns created on the Vectrix VX384 Color System. Note the color illusion in 7B.

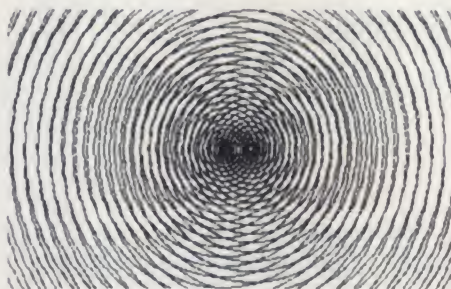


6C

```

10 ML = 1
20 SCREEN 2
30 CLS
40 S1 = 2*3.14159/360
50 FOR AN = 0 TO 15*2*3.14159 STEP S1
60 GOSUB 210
70 NEXT AN
80 S1 = S1/2
90 ML = ML/2
100 NL = 16*2*3.14159
110 FOR AN = NL TO 30*2*3.14159 STEP S1
120 GOSUB 210
130 NEXT AN
140 S1 = S1/2
150 ML = ML/2
160 NL = 31*2*3.14159
170 FOR AN = NL TO 45*2*3.14159 STEP S1
180 GOSUB 210
190 NEXT AN
200 END
210 RD = RD + ML*.01
220 RS = RD*SIN(AN)
230 RC = RD*COS(AN)
240 X = 310 + RS
250 Y = 100 + RC
260 W = 330 + RS
270 Z = 100 - RC
280 PSET (X,Y)
290 PSET (W,Z)
300 RETURN

```



6D

```

10 ML = 1
20 SCREEN 2
30 CLS
40 S1 = 2*3.14159/360
50 FOR AN = 20 TO 15*2*3.14159 STEP S1
60 GOSUB 210
70 NEXT AN
80 S1 = S1/2
90 ML = ML/2
100 NL = AN
110 FOR AN = NL TO 30*2*3.14159 STEP S1
120 GOSUB 210
130 NEXT AN
140 S1 = S1/2
150 ML = ML/2
160 NL = AN
170 FOR AN = NL TO 45*2*3.14159 STEP S1
180 GOSUB 210
190 NEXT AN
200 END
210 RD = AN*AN/250
220 RS = RD*SIN(AN)
230 RC = RD*COS(AN)
240 X = 310 + RS
250 Y = 100 + RC
260 W = 330 + RS
270 Z = 100 - RC
280 PSET (X,Y)
290 PSET (W,Z)
300 RETURN

```

In pattern 6C, the two simple spirals are offset by 20 dots (see lines 240 and 260 of the program). The pattern looks like radial straight lines, which is as surprising to me as were the parallel straight lines of the zone plates. In pattern 6D, I took another bold step and used a more complex spiral, where the radius is proportional to the square of the angle (see line 210). A pattern emerged that looks something like the field around the poles of a magnet.

Color Graphics

It is not likely that you have an expensive, high-resolution, infinite color palette, graphics system in your home. But one reference made some comments about color illusions that I wanted to check. I had access (courtesy of MAC-I, Calabasas, CA) to a Vectrix VX384 with 672 x 480 dots resolution and a choice of any 512 of 16 million colors. Trying moiré patterns with such a marvelous machine was irresistible. The Vectrix was controlled by a Kaypro II, and I was able to program in MBasic, this time using the MBasic line editor, since I did not have my tools on the Kaypro.

Figure 7 shows three of the many patterns I made, two with the standard overlapping circles. In the second pattern, the illusion of white (from green and purple) is clear in the center of the pattern. In the third pattern (shown on page 174), radial straight lines of alternating color, the hoped for illusion was not striking, but the detail near the center of the pattern was very rewarding anyway.

That's Not All Folks

This article presents but a fraction of all the moiré patterns I have seen. Now it's time for you to start that stack of paper running through your printer. EN

COST ISN'T OUR ONLY ADVANTAGE

Our complete line of 100% Apple[®] compatible disk drives are not only superior in performance and reliability; they offer you a choice.

Whether you select our full height AP-100, our slim line AP-105 or our new ergonomically designed twin pack AP-110, you can rely on Quentin to deliver quiet, fast and efficient performance.

When you are ready to step up to Winchester mass storage, Quentin will be there to meet your growing needs, from 5 to 31 megabytes of formatted capacity with the Q-500 and Q-600 series.

Every Quentin drive has been engineered to provide you with years of reliable service and we stand behind that promise with a one year limited warranty on parts and labor. Your Authorized Quentin dealer will be happy to demonstrate all of the outstanding features of our range of disk storage products, including the cost; but remember "cost isn't our only advantage."

QUENTIN[™]

100% Apple[®] Compatible
Quentin Research, Inc.
9207 Eton Avenue,
Chatsworth, Ca. 91311
(213) 709-6500

●CIRCLE 276 ON READER SERVICE CARD



Q-500

AP-110

AP-105

AP-100

Quentin is a registered trademark of Quentin Research, Inc.
Apple is a registered trademark of Apple Computer, Inc.

Hidden Surface Elimination The Easy Way

One of the most studied problems in the rapidly growing field of computer graphics is that of hidden surface elimination. This involves detecting which surfaces of objects are hidden by other surfaces and hence should not be drawn. In this article, we take a look at one of the simplest hidden surface algorithms and at a program that implements this algorithm. Along the way, we talk about the perspective transformation itself and clear up some of the jargon about the different coordinate systems we use.

Matrix Transformations

The three basic transformations we will be using are scaling, rotation, and translation. Both John D. Fowler [1,2] and Christopher Hansen [3] demonstrated ways of handling these transformations in earlier issues of *Creative Computing*. A cleaner, more uniform way to represent these transformation equations is by using matrices.

Figure 1 shows the transformation equations along with their matrix representation for the two-dimensional case. Adding a third element to the point (x,y) allows us to multiply it by a 3 x 3 transformation matrix. (Matrix multiplication is defined only for matrices in which the number of columns in the first matrix equals the number of rows in the second.) If your linear algebra is a little

Randi J. Rost

rusty, you may want to carry out the matrix multiplications indicated in Figure 1 to verify that the matrix representation provides the same results as the equations.

Using matrices allows us to concatenate transformations quite easily.

Only rarely would we want to perform just one of the simple transformations. For instance, if a triangle described by the points $v1=(x1,y1)$, $v2=(x2,y2)$, and $v3=(x3,y3)$ is to be doubled in size but remain with one vertex at $v1$, three transformations are needed. We cannot just multiply all of the coordinates by two. The result would be a triangle that is twice as large, but would be fixed at the point $(2*x1,2*y1)$ instead of at $(x1,y1)$. To obtain the desired result, we first need a translation by $(-x1,-y1)$ to translate the triangle to the origin. Then we can scale all the coordinates by two and translate by $(x1,y1)$. This moves our properly scaled triangle back to point $v1$.

Two or more transformations can be concatenated (combined) to yield a single transformation. This concatenated transformation will give the same result

Transformation	Equation Form	Matrix Representation
Translation	$\begin{aligned} x' &= x + Tx \\ y' &= y + Ty \end{aligned}$	$(x' \ y' \ 1) = (x \ y \ 1) \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ Tx & Ty & 1 \end{pmatrix}$
Scaling	$\begin{aligned} x' &= x * Sx \\ y' &= y * Sy \end{aligned}$	$(x' \ y' \ 1) = (x \ y \ 1) \begin{pmatrix} Sx & 0 & 0 \\ 0 & Sy & 0 \\ 0 & 0 & 1 \end{pmatrix}$
Rotation	$\begin{aligned} x' &= x*\cos\theta + y*\sin\theta \\ y' &= y*\cos\theta - x*\sin\theta \end{aligned}$	$(x' \ y' \ 1) = (x \ y \ 1) \begin{pmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{pmatrix}$

Figure 1. Two-dimensional transformations. (Note that rotation is by the angle θ , where θ is measured in the clockwise direction.)

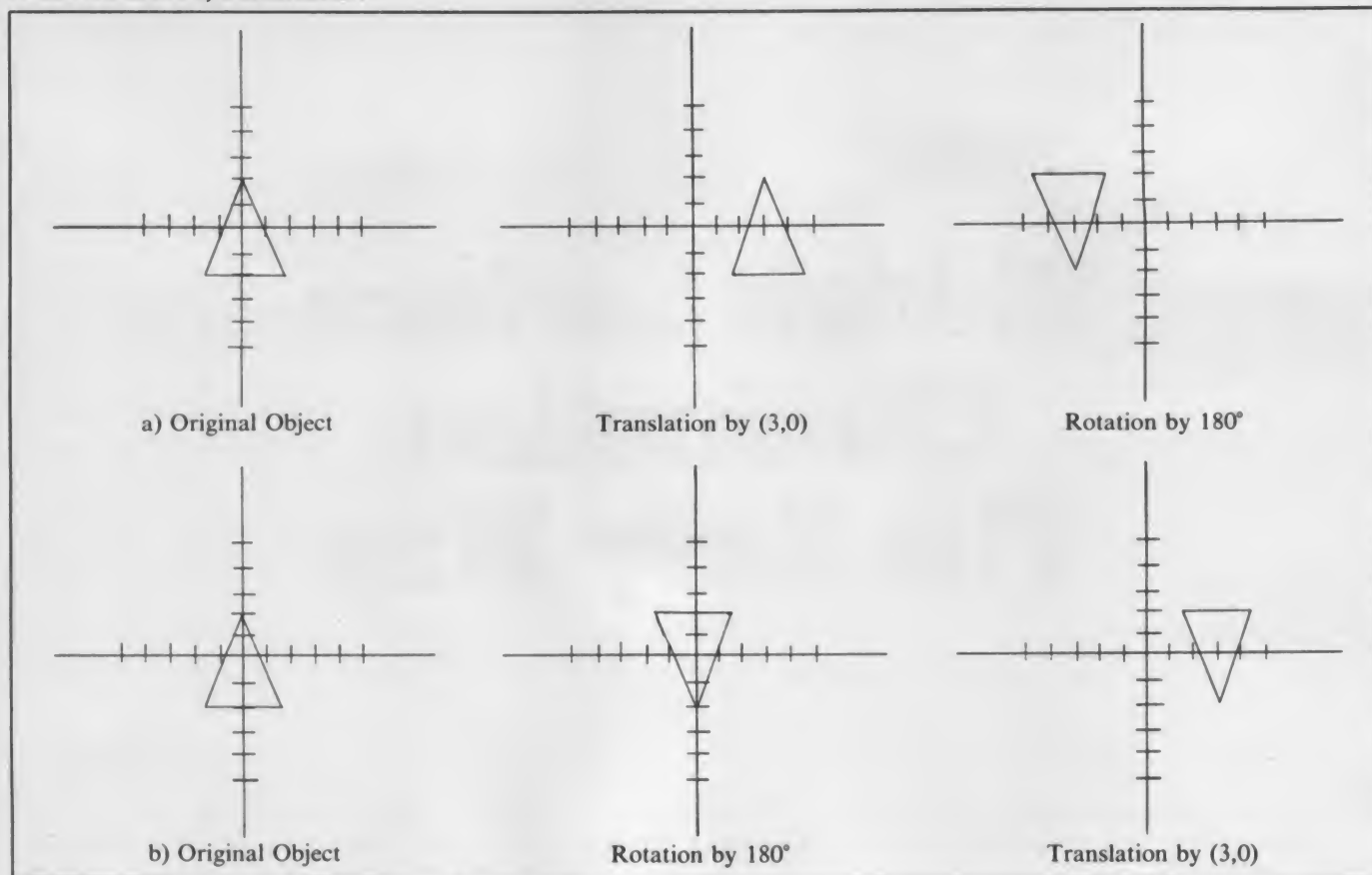


Figure 2. Order is important in the transformation process.

as the separate, simple transformations, provided the *sequence* of transformations is kept intact. Figure 2 shows that the transformation process is not commutative, since reversing the order of transformations can yield entirely different results.

Using matrices allows us to concatenate transformations quite easily. The individual transformation matrices are multiplied together from left to right in the order in which they are to occur. The result is a single transformation which contains all of the sequence information. This matrix can now be used to transform any number of individual points without having to calculate all the transformation information each time. For a long series of transformations with rotations involving sines and cosines, the savings can be considerable. And we would all like our microcomputers to run at lightning speed, wouldn't we?

The transformation matrices can be generalized to three dimensions as well. Each point in three dimensions is represented as a 1×4 row vector that looks like $(x \ y \ z \ 1)$. Similarly, the transformation matrix increases in size to a 4×4 matrix. In three dimensions, we have three different kinds of rotation with which to be concerned. It now becomes

possible to rotate around the x-axis, the y-axis, or the z-axis instead of simply about the origin as in two dimensions.

Matrices to handle these three types of rotation as well as scaling and translation are shown in Figure 3.

Transformation	Matrix Representation
Translation	$(x' \ y' \ z' \ 1) = (x \ y \ z \ 1) \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ T_x & T_y & T_z & 0 \end{pmatrix}$
Scaling	$(x' \ y' \ z' \ 1) = (x \ y \ z \ 1) \begin{pmatrix} S_x & 0 & 0 & 0 \\ 0 & S_y & 0 & 0 \\ 0 & 0 & S_z & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
Rotation about X-axis	$(x' \ y' \ z' \ 1) = (x \ y \ z \ 1) \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos\theta & -\sin\theta & 0 \\ 0 & \sin\theta & \cos\theta & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
Rotation about Y-axis	$(x' \ y' \ z' \ 1) = (x \ y \ z \ 1) \begin{pmatrix} \cos\theta & 0 & \sin\theta & 0 \\ 0 & 1 & 0 & 0 \\ -\sin\theta & 0 & \cos\theta & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
Rotation about Z-axis	$(x' \ y' \ z' \ 1) = (x \ y \ z \ 1) \begin{pmatrix} \cos\theta & -\sin\theta & 0 & 0 \\ \sin\theta & \cos\theta & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$

Figure 3. Three-dimensional transformation matrices. Rotations are by the angle θ , where θ is measured in the clockwise direction when viewed from the positive side of the axis about which the rotation is performed.

Coordinate Systems

Now that we have developed the matrix representation needed to describe transformations, we need to define some terms so our discussion may proceed. All of the points to which we have referred so far have been points in a cartesian coordinate system. The units on this coordinate system vary from application to application. An architect may define his coordinate system to have the origin at the front right corner of the building, with the x-axis measuring distance left, the y-axis measuring depth, and the z-axis measuring height. Perhaps he will decide to express the units in meters (or even feet, as is the custom in some backward countries). An astronomer might

To calculate the position on the screen of a particular point on the object being displayed, it is necessary first to transform the point into the eye coordinate system.

wish to have the origin of his coordinate system at the center of the sun and the units be in light years or parsecs (contrary to popular belief, these are units of distance, not time).

This somewhat arbitrary choice of a coordinate system corresponds to some individual's view of objects in the real world. For this reason, this coordinate system, once defined, is known as the *world coordinate system*. The object to be displayed and the position from which it will be viewed can both be given in world coordinates.

The image will eventually have to be displayed using the screen coordinates of a specific display device. The *screen coordinate system* is a two-dimensional coordinate system that generally uses x to denote horizontal screen position and y to denote vertical position. The Apple screen coordinate system ranges from 0 to 279 along the x-axis and from 0 to 191 along the y-axis.

To calculate the position on the screen of a particular point on the object being displayed, it is necessary first to transform the point into the *eye coordinate system*. This system has the eye centered at the origin and the z-axis pointed in the direction of view. This gives us coordinates very close to the form needed for displaying on the screen. The x and y

INCREASE YOUR KNOWLEDGE AND CONFIDENCE WITH **THREE** **GREAT IDEABOOKS** FOR YOUR HOME COMPUTER SYSTEM!

Imagine harnessing the full potential of your home computer system! CREATIVE COMPUTING's IDEABOOKS give you a wealth of information to help you discover your computer's hidden strengths and overcome its weaknesses!

Beginning with chapter one, you will start getting more out of your system...for example:

- 50 ready-to-run tested programs that will help you solve practical,

everyday problems in math, science and business.

- Solve problems with formulas and repetitive trials, convergence, recursion, compounding, probability geometry, science, simulations and drill and practice.

- Tap into the true capabilities of your home system! Identify the shortcomings and recognize the types of jobs and applications best suited for your system!

Your IDEABOOK will supplement the user manual giving you the confidence and knowledge to make the most out of your home system, at an affordable price of only \$8.95!

Don't go another day without your copy of CREATIVE COMPUTING's IDEABOOK!

**For faster service,
phone Toll Free:**

1-800-631-8112

(in New Jersey call 201-540-0445)

IDEABOOKS are available
at your local bookstore
or computer store.



Creative Computing Press

Dept. MA1B
39 E. Hanover Avenue
Morris Plains, NJ 07950

Please send the following books:

TITLE	BOOK NO.	QUANTITY	PRICE EACH*	\$2.00 POSTAGE/HANDLING EACH	TOTAL
Epson HX-20 Ideabook	3S		\$8.95		
TI Ideabook	3R		\$8.95		
TS1000 Ideabook	3P		\$8.95		
				TOTAL AMOUNT DUE	

CA, NJ & NY State residents add applicable sales tax.*
Outside U.S.A. add \$3.00 per order

☐ Payment Enclosed

☐ CHARGE MY: ☐ American Express ☐ Visa ☐ MasterCard

Card No. _____ Exp. Date _____

Mr./Mrs./Ms. _____
please print name in full

Address _____ Apt. _____

City _____ State _____ Zip _____

☐ Please send me a Free Creative Computing Press Catalog.

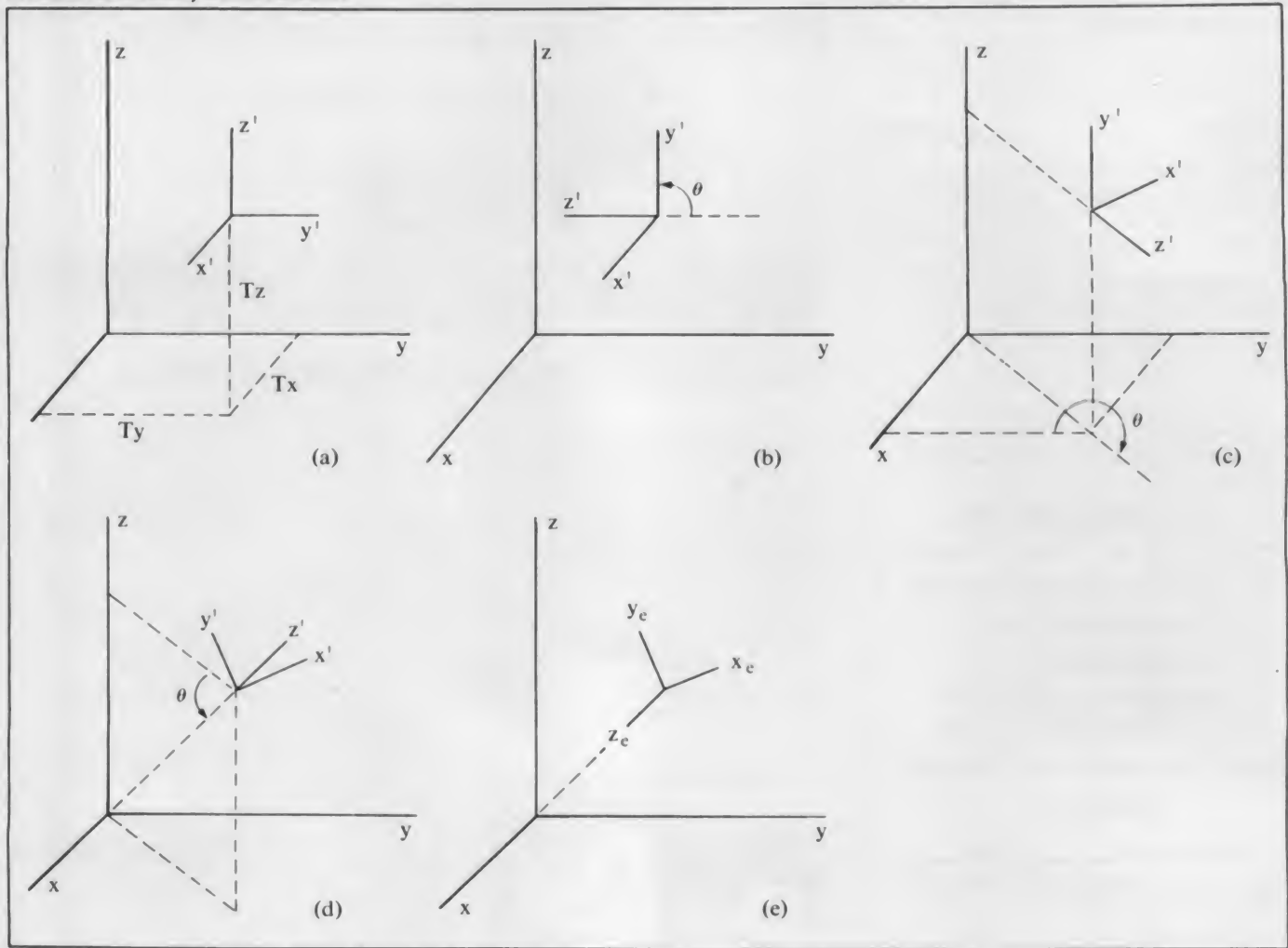


Figure 4. Steps in the viewing transformation.

axes will be aligned with the x and y axes of the screen, and the z-axis will indicate a depth into the scene (distance to the object.)

The Viewing Transformation

Figure 4 demonstrates the steps necessary to transform points in the world coordinate system into points in the eye coordinate system. This is known as the viewing transformation.

The first step (Figure 4a) is to translate the origin to the position of the eye. Any transformation that moves the entire coordinate system is the inverse of the corresponding transformation that moves points. Therefore it is necessary to use negative values for the x, y, and z translation factors.

The second step (Figure 4b) is to rotate clockwise by -90° about the x-axis to align the y-axis vertically. Next, (Figure 4c) a rotation about the y-axis is performed so that the projection of the z-axis onto the xy-plane will be pointing away from the origin. Another rotation about the x-axis is performed (Figure 4d) to orient the z-axis so that it now

points directly away from the origin. The final step (Figure 4e) is to invert the z-axis to point directly at the origin.

We now have coordinates for the object in the eye coordinate system so we are nearly ready to display it. All that is necessary now is to scale the object so that it is an appropriate size on the screen and convert the points into screen coordinates. This last conversion from eye to screen coordinates is accomplished using the following equations:

$$\begin{aligned}x_s &= (x_e/z_e) * px + c1 \\ y_s &= (y_e/z_e) * py + c2\end{aligned}$$

where (x_e, y_e, z_e) is the point in eye coordinates, $(c1, c2)$ is the point corresponding to the middle of the display screen, px is the number of pixels horizontally and py is the number of pixels vertically. The point (x_s, y_s) can now be plotted on the screen. This transformation takes straight lines in the eye coordinate system to straight lines in the screen coordinate system. Therefore it is necessary only to transform the endpoints of an edge of an object into screen coordinates, then draw the line connecting them.

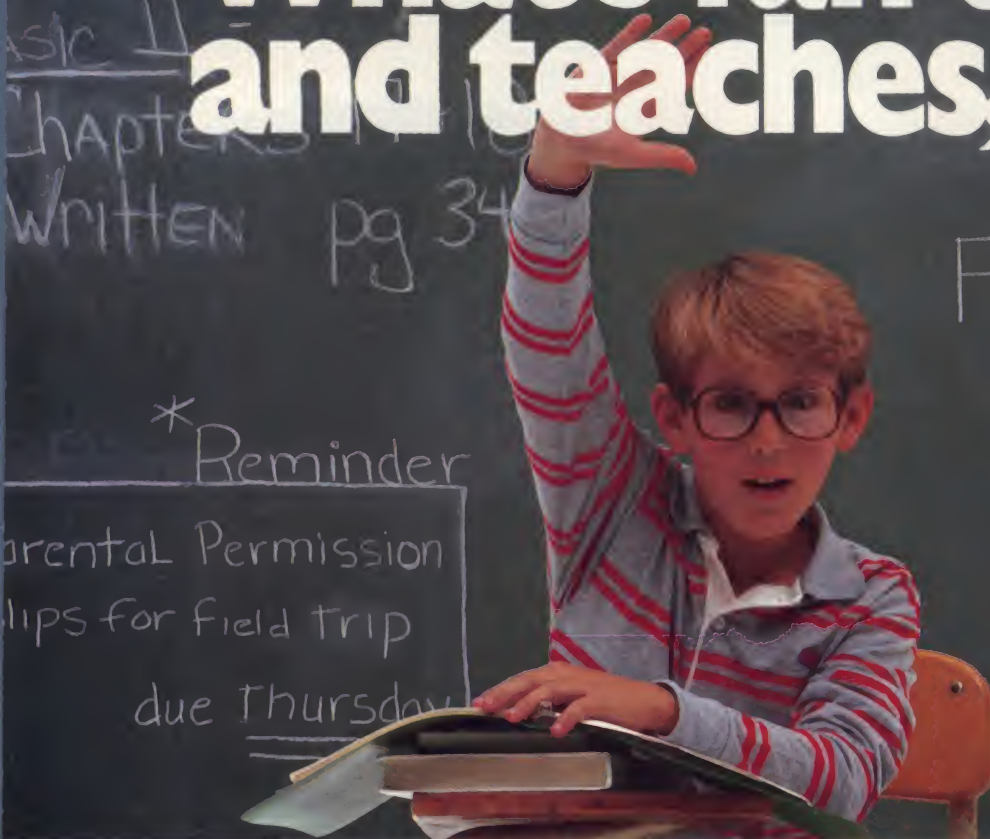
Hidden Surfaces Be Gone!

One way to make a complicated task easier is to restrict the conditions under which it is guaranteed to work. In this case we will limit the class of objects on which our hidden surface algorithm will work to the set of convex polyhedra. A convex polyhedron is a solid bounded by many faces in which none of the interior angles is greater than 180° . Thus cubes, solid rectangles, and pyramids are all convex polyhedra, while an L-shaped house is not, since the interior angle at the bend of the L is 270° .

This restriction on the type of object makes it easy to determine which surfaces are visible and which are not. All we have to do is eliminate surfaces of the object that are facing away from the viewer. The geometry of a convex polyhedron guarantees that such faces will be obscured by other faces that are pointed toward the viewer.

How do we determine whether or not a surface is oriented toward the viewer? The first step is to compute an outward-facing normal for the face of the object under consideration. You will recall that

What's fun to do and teaches, too?



That's an easy one: HesWare™ educational software.

The children with the most answers in school are usually the children who enjoy learning. HesWare helps develop your child's interest in learning by making it fun. And along the way, develop familiarity and proficiency with computers—a skill that is becoming more and more essential to success.

HesWare educational software combines enjoyment with a creative learning experience. Unlike video games, HesWare educational programs involve your child—and that keeps their interest. Whether it's creating colorful and artistic pictures with Turtle Graphics, making up funny faces with Facemaker™, or helping America's favorite canine, Benji, save kidnapped scientists (and learn about the solar system in the process,) or any of the programs in our education library, HesWare gives your children a positive attitude toward learning and technology.

It's not expensive to give your child a headstart on the future. HesWare programs are available for most popular home computers, including the Commodore VIC 20™, Commodore 64™, Atari®, and IBM®.

HesWare educational software. Just one of the ways HesWare is expanding the computer experience. And expanding your child's horizons. Look for them at your favorite software retailer.

**Pleases the
tough
customer.**

HesWare™

Human Engineered Software, 150 North Hill Drive, Brisbane, CA 94005
800-227-6703 (in California 800-632-7979) Dept. C20



HesWare is a trademark of Human Engineered Software. Facemaker is a trademark of Spinnaker Software. VIC 20 and Commodore 64 are trademarks of Commodore Electronics Ltd. Atari is a registered trademark of Atari, Inc. IBM is a registered trademark of International Business Machines.

© 1983

CIRCLE 133 ON READER SERVICE CARD



Betcha Can't Play Just One!



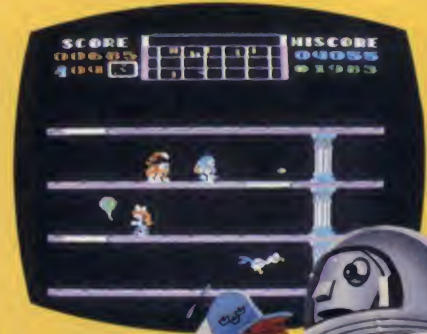
Drol™



You will soon come to expect the unexpected in the hilarious and challenging underground dream world of Drol. A little red-headed girl and her propeller-beanie brother have been lured by a witch doctor's curse into the multi-levelled ruins of a lost civilization. It's your task — as a hero equipped with a rocket backpack and full-screen radar scope — to dodge hopping scorpions, monsters and snakes, flying turkeys, swords, daggers, arrows, magnets, witch doctors, and vacuum cleaners(!) in your attempts to rescue the children and reunite them with their mother. Each new level of game play is full of surprises.

Drol's wry sense of humor and amazingly detailed cartoon imagery, make this game a charmer!

For the Apple II/II+ /IIe, Atari, and Commodore 64 home computers in disk format.



Gumball™



Hours of fun await you at the Sticky Sole Gumball Factory — where you'll be working against the clock to sort a tasty collection of colorful gumballs.

Your job may seem sweet at first, but after you've discovered the explosive-laced gumballs (placed by over-zealous dental assistants) or met

your irritating supervisor (who is eager to undo your best efforts), you may feel that you have bitten off more than you can chew.

If, against all odds, you meet your day's quota, you'll be promptly rewarded with a promotion (to a more challenging position) and an amusing cartoon showing your higher standard of living.

Gumball — a new fast action game filled with colorful and delicious surprises.

For the Apple II/II+ /IIe.



Irresistible Fun From Broderbund!

Ask your Broderbund dealer for Sneak Previews.



Broderbund Software™
Discover the Difference

17 PAUL DRIVE, SAN RAFAEL, CALIFORNIA 94903

Apple II/II+ /IIe, Atari, and Commodore 64 are trademarks of Apple Computer, Inc., Atari, Inc., Commodore Electronics Ltd., respectively.

CIRCLE 196 ON READER SERVICE CARD

Hidden Surface, continued...

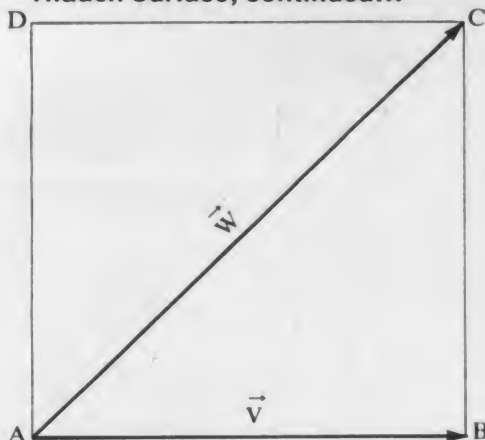


Figure 5. Points A, B, and C on a face of an object can be used to compute vectors V and W .

a vector normal to a plane is just a vector that is perpendicular to the plane. You may also recall that taking the cross product of two vectors always yields a third vector that is normal to the first two vectors.

Order is important in the cross product operation though. Figure 5 shows the vertices of a square face and two vectors, V and W , that have been defined by the points A, B, and C. Taking $V \times W$ results in a vector that is pointing directly out of the page, with its initial point at A. Taking $W \times V$ will yield a vector that is also based at A, but pointing directly into the page.

A mnemonic to aid in remembering the orientation of a cross product is the "right hand rule." It states that if you place the bottom edge of your right hand along the first vector and curl your fingers in the direction of the second vector, your right thumb will point in the direction of the cross product vector. Clearly, if we always specify the vertices of a face in counterclockwise order when viewed from the outside, we can always use the first three points to form vectors V and W and $V \times W$ will be an outward-facing normal.

Whew! That sounded pretty tough, but really it is not so bad. A vector is formed by taking the x , y , and z components of one point and subtracting the x , y , and z components of the second point. Imagine that the square in Figure 5 is one of the faces of our object. We can get one vector (V) by taking $B-A$ and the second vector (W) by taking $C-A$. These computations must be performed in the eye coordinate system, since we are concerned with the relationship between the eye and a specific face of the object.

Now we have our outward-facing normal, so let's get a vector from the eye to the base of that normal. The normal we just computed will have its initial point at the first vertex of the face (point A),

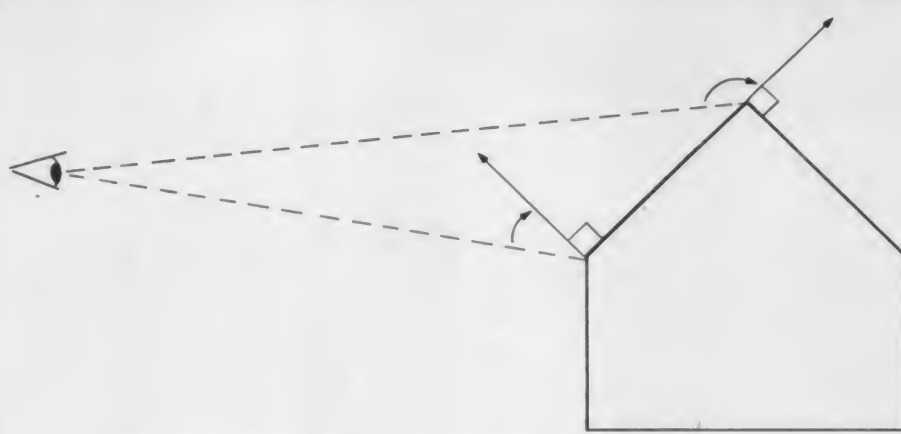


Figure 6. Viewing the "roof" of a house-shaped object. The face whose normal vector makes an acute angle with the vector from the eye is visible while the one that makes an obtuse angle is not.

and the eye will be at the point $(0, 0, 0)$. Therefore, the components of this eye-to-object vector will be the same as the x , y , z components of point A.

Figure 6 shows a viewer looking at the roof of a house. Normals have been computed for both parts of the roof, and the vector between the eye and the base of each normal is also shown. Guess what? The angle between the eye vector and the normal vector is acute (less than 90°) for the face that is visible, and obtuse (greater than 90°) for the face that isn't visible. That is all there is to this hidden

even have to divide the dot product by the lengths of the two vectors. We can simply compute the dot product of the two vectors, and if the result is less than zero, the face is hidden from view and need not be drawn.

Degrees of Freedom

There are actually seven parameters, or "degrees of freedom" that must be specified to display an object as seen from any vantage point. Three of these are involved in the difference between the position of the object and the viewing location. Two more degrees of freedom are defined by specifying either two angles or a point toward which the gaze is directed. For instance, when viewing a house, the image is shifted up and down or left and right depending on whether you are looking at the chimney or the doorknob on the front door.

The horizon may also be rotated to alter the orientation of the image. This corresponds to the pictures you get by rotating a camera through some angle. The last parameter is just a scaling factor. A telephoto lens will produce the same result: a larger image.

The Program

The program that incorporates the hidden surface algorithm is shown in Listing 1. I have tried to put all of the system-dependent items near the top of the program, and I point them out as we run in to them. The `(*SS*)` at the beginning is used to put the Apple Pascal compiler in swapping mode so that larger programs can be compiled. Apple Pascal gets routines for graphics and transcendental functions like sine and cosine from libraries called *units*. The two special Apple libraries that contain these functions are *Turtlegraphics* and *Transcend*. This explains the "uses" statement right after the program statement.

A mnemonic to aid in remembering the orientation of a cross product is the "right hand rule."

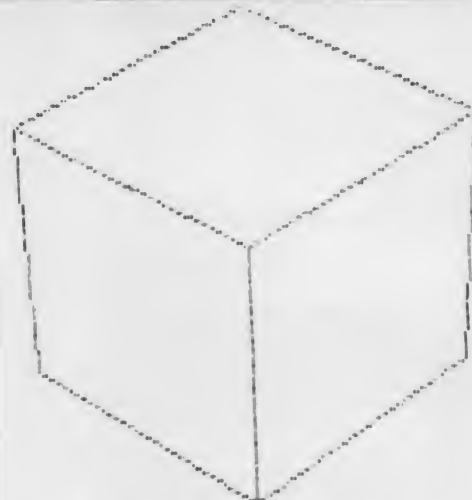
surface algorithm. All we need to do is compute those two vectors and check the angle between them for each face of the object. If the angle is obtuse, we throw that face out and go on to the next one. If it is acute, we draw it. Simple, huh?

How do we tell if the angle is greater than 90° ? Two more tricks will help, one each from trigonometry and linear algebra. First, the cosine of any angle between 90° and 180° is negative. Second, an easy way to compute the cosine of the angle involved is to take the dot product of the two vectors and divide by the length of each vector. The dot product of two vectors U and V is written as $U \cdot V$ and is just

$$U \cdot V = (u_x \ u_y \ u_z) \cdot (v_x \ v_y \ v_z) = u_x v_x + u_y v_y + u_z v_z$$

Since we need to know only whether the cosine is positive or negative, we don't

Figure 7. Perspective view of the cube defined by the data in Listing 2. The viewing position was (5.5,5), the focus point was (0,0,0), horizon rotation was 0°, and scaling factor was 6.



Functions like moving to a point on the graphics screen without drawing, drawing a line, and reading data will also be system-dependent. The eye-to-screen conversion will need to be changed if screen coordinates on your system differ from the 280 x 192 of the Apple. (Also note that the point (0,0) is in the lower lefthand corner in Apple Pascal.)

The program begins by reading in the data for the object to be displayed. The Readdata procedure expects to find the data for an object in a file called DATAFILE.TEXT on a disk in device #4 (slot 6, drive 1.) The data should be organized in the following manner:

1. The first line of the file should contain the number of faces of the object.
2. The object should have one vertex at the point (0 0 0). (All vertices in the file will be in the world coordinate system.)
3. For each face, an arbitrary starting vertex is chosen. X, Y, and Z-coordinates for this point are written on the next line of the file.
4. Successive lines of the file contain the remaining vertices of the face. These vertices should be specified in counter-clockwise order when viewed from the outside, so that outward-facing normals can be computed.

5. The starting vertex is also the ending vertex, and is written into the file a second time.

6. A line consisting of -999 0 0 is written to indicate the end of information for that face.

7. Steps 3 through 6 are repeated for each face.

Listing 2 shows the data for specifying a cube with edges of length 1.

After the data has been read in, the user is prompted for the viewing parameters. Those familiar with the unforgiving nature of Apple Pascal I/O will know better than to make any typing mistakes. World coordinates are used to specify a position from which to view the object and a point toward which the gaze will be directed. A horizon rotation and a scaling factor complete the information needed to compute the viewing transformation.

Once the transformation matrix is obtained, the screen is cleared, and the object is drawn. For each face, three points are transformed into eye coordinates and used to compute a normal. This vector is then dotted with the vector from the eye.

Listing 2.

```

6
1.0      0.0      0.0
1.0      1.0      0.0
1.0      1.0      1.0
1.0      0.0      1.0
1.0      0.0      0.0
-999.0    0.0      0.0
1.0      1.0      0.0
0.0      1.0      0.0
0.0      1.0      1.0
1.0      1.0      1.0
1.0      1.0      0.0
-999.0    0.0      0.0
0.0      1.0      0.0
0.0      0.0      0.0
0.0      0.0      1.0
0.0      1.0      1.0
-999.0    0.0      0.0
0.0      0.0      0.0
1.0      0.0      0.0
1.0      0.0      1.0
0.0      1.0      1.0
0.0      0.0      1.0
1.0      0.0      1.0
-999.0    0.0      0.0
1.0      0.0      0.0
0.0      0.0      0.0
0.0      1.0      0.0
1.0      1.0      0.0
-999.0    0.0      0.0

```

If the result is positive, the rest of the vertices of that face are transformed and the edges drawn. Otherwise, the face is hidden, so it is not necessary to transform the rest of the points or draw the face.

Pascal is useful for breaking a programming task into smaller subtasks. Each of these subtasks is relatively easy to code, leading to an overall reduction of programming effort. In this program, I have used separate procedures for multiplying two matrices, transforming a single point, calculating dot and cross products, and so on.

Extensions, Enhancements, Etc.

The most obvious extension to this program is to include data for your own shape, in the format outlined above. Be advised that this program does not do three-dimensional clipping. If you specify a viewing location too near the object, some of the edges may extend off one side of the screen and wrap around to the other. Details on how clipping may be performed can be found in reference [6].

Other enhancements include error-trapping during the user input and the usual speed and efficiency improvements. The format for the data file is quite redundant, sometimes leading to a single vertex being included six times in the file. Such inefficiencies were ignored so as not to clutter the program and to retain maximum clarity of the algorithm itself.

Conclusion

The human brain is able to absorb and assimilate graphic information much more readily than numeric information. A perspective view of an architect's design is more readily understood than a textual description. Computer graphics can make the computer easier to use, as well as expanding its usefulness. We are only now beginning to see the impact that graphics can have on business, science and engineering, and the arts. The principles of transformations and coordinate systems discussed in this article will give you a good start toward understanding the graphics applications of tomorrow. □

Listings on pp. 198

References

1. Fowler, John D., Jr., "Stereo Graphics: Part 1," *Creative Computing*, Jan. 1983.
2. Fowler, John D., Jr., "Stereo Graphics: Part 2," *Creative Computing*, Feb. 1983.
3. Hansen, Christopher, "A Graphics Package for the Apple," *Creative Computing*, July 1982.
4. Isaak, S. and Manougian, M. N., *Basic Concepts of Linear Algebra*, W. W. Norton & Co., New York, 1976.
5. Leithold, Louis, *The Calculus With Analytic Geometry*, Third Edition, Harper & Row, New York, 1976.
6. Newman, W. M., and Sproull, R. F., *Principles of Interactive Computer Graphics*, Second Edition, McGraw-Hill, Inc., New York, 1979.

MICRO BEE SOFTWARE

Manufacturing licences for the popular Australian designed Micro Bee computer have recently been granted to many companies throughout the world.

MYTEK Computing is the largest and most respected producer of software for the Micro Bee Computer.

MYTEK Computing invites dealers to sample its large and extensive range of Micro Bee Software.

Micro Bee users are also invited to request to be included on MYTEK Computing's free mailing list. Catalogues are air-mailed regularly to all parts of the world.



1 Kent Street, Bicton, 6157, Perth, Western Australia
Telephone: (09) 330 7336

CIRCLE 179 ON READER SERVICE CARD

*REDUCES DISKETTE COST 50%! DOUBLES DISKETTE STORAGE SPACE



Owners of 5 1/4" *single "read/write" head disk drives can immediately double diskette storage space by using **NIBBLE NOTCH I or II**. The back of single sided diskettes are burnished. To use it you need a "write enable notch," and some also need in addition, an "index hole." **NIBBLE NOTCH I and II** are precision engineered tools designed exclusively for this purpose.

NIBBLE NOTCH I

(Cuts square Write Enable Notch) For users of Apple, Franklin, Kaypro, Atari, Commodore and most other soft sectored systems.

only **\$14.95** each
add \$1.50 each P&H / (\$4.50 foreign P&H)

NIBBLE NOTCH II

(Cuts square Write Enable Notch and 1/4 inch round "index hole") for owners of IBM, TRS 80 I & III, Osborne and others needing "index hole", and all other "hard sectored" systems.

only **\$21.90** each
add \$2.50 each P&H / (\$6.50 each foreign P&H)

Florida Residents Add 5% Sales Tax

• IT'S A MONEY SAVER! •

Sold at leading computer and office supply stores in your area.
Dealer inquiries are invited.

ORDER TODAY!

SEND CHECK OR MONEY ORDER TO:

NIBBLE NOTCH™

DIVISION OF CORTAN INTERNATIONAL

4211 N.W. 75 TERRACE • DEPT. 54 • LAUDERHILL, FL 33319
PAT. PEND. ALL TRADEMARKS ARE ACKNOWLEDGED

CIRCLE 146 ON READER SERVICE CARD

HOW TO MAKE THE MOST OF YOUR MICRO With These Idea-Packed Books From Scott, Foresman

Introducing Scott, Foresman's new line of microcomputer books. We give you the techniques and programs you need to expand your micro's capabilities—without taking a large bite out of your wallet.

AT YOUR FINGERTIPS:

MAKING THE MOST OF THE MICRO by Jeff Berner. Based on the popular BBC television show currently seen on PBS stations around the country. A lively, fully illustrated introduction to microcomputers and their applications.



dBASE II FOR THE PRO-

GRAMMER: A HOW-TO-DO-IT BOOK by Nelson T. Dinerstein. This book helps professional programmers develop quality application systems in dBase II. Includes numerous programs, sub-routines, and advice on overcoming common programming problems.

A LIBRARY OF SUBROUTINES FOR THE IBM PERSONAL COMPUTER

by David S. Walonick. Packed with tested subroutines for a wide range of personal and business applications, including subroutines on time, math, sorting, printing, and keyboarding. This book can help you cut your programming time in half!

Reply now to begin making the most of your micro. To order, contact your local bookstore or computer store, or send the attached coupon to

Scott, Foresman and Company
Professional Publishing Group,
Dept. CC-1
1900 East Lake Avenue
Glenview, IL 60025
312-729-3000

Send me:

AT YOUR FINGERTIPS

\$12.95, 18049

dBASE II FOR THE PROGRAMMER

\$19.95, 15956

A LIBRARY OF SUBROUTINES

\$18.95, 15965

Check method of payment:

☐ Check/Money Order

☐ MasterCard ☐ Visa

Amount Enclosed \$ _____

Card # _____

Exp. Date _____

Signature _____

Name _____

Address _____

City/State/Zip _____

Add applicable sales tax, plus 6% of Total for U.P.S. Prices subject to change without notice.

CC-1

CIRCLE 161 ON READER SERVICE CARD

YOUR CHILDREN'S FUTURE



BEGINS TODAY

Discover how you
can help your
children grow with
educational software
from Opportunities
for Learning.

Write for your
FREE catalog today!



**OPPORTUNITIES FOR
LEARNING, INC.**

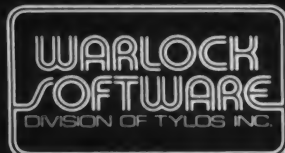
8950 Lurline Ave., Dept. L62
Chatsworth, CA 91311
(213) 341-2535

CIRCLE 279 ON READER SERVICE CARD



THE HIGH TECH TAROT FOR THE WORTHY

Only \$39.95 (postage included,
USA and Canada only) for the
Apple II+ and IIe, 48K*.
Unprotected for your convenience.
SATISFACTION GUARANTEED
C.O.D., check or money order



1900 Emery St., Suite 318
Atlanta, GA 30318 (404) 352-1015

* Apple II+ and IIe are registered trademarks of
Apple Computer Inc. Graphics created with
Penguin Software's Graphics Magician

CIRCLE 230 ON READER SERVICE CARD

Hidden Surface, continued...

Listing 1.

```
(*)
    This program will draw a three-dimensional perspective view of the
    convex polyhedron described by data points in the file 'DATAFILE.TEXT'.

                                Author: Randi J. Rost
                                Date:   Feb. 10, 1983

*)

(**$S+*)

program draw3d(input, output, datafile);
    uses transcend, turtlegraphics;

const
    maxfaces=100;
    maxpts=500;
    pi=3.14159;

type
    matrix = array [1..4, 1..4] of real;

var
    where: array [1..maxfaces] of integer;
    xpt, ypt, zpt: array [1..maxpts] of real;
    mat, t1, t2: matrix;
    x1, y1: real;
    numfaces, nextpt, avail: integer;
    eyex, eyey, eyez: real;
    fx, fy, fz: real;
    d1, d2: real;
    horizrot, ds: real;
    datafile: text;
    v1, v2, v3: real;
    w1, w2, w3: real;
    n1, n2, n3: real;
    temp1, temp2, temp3: real;
    dot: real;
    start: integer;
    ch: char;

procedure initscrn;
(*)
    Turn on graphics mode and clear screen.
*)

begin
    initturtle;
end;

procedure moveabs(x,y: real);
(*)
    Move to position (x,y) without drawing.
*)

begin
    pencolor(none);
    moveto(round(x),round(y));
end;

procedure drawabs(x,y: real);
(*)
    Move to position (x,y) and draw the line in white.
*)

begin
    pencolor(white);
    moveto(round(x),round(y));
end;

procedure readdata;
(*)
    Read the shape data from the file DATAFILE.TEXT.
*)

var
    i: integer;

begin
    reset(datafile, '#4:datafile.text');
    avail:=1;
    readln(datafile, numfaces);
    for i:=1 to numfaces do
```



```

begin
  where[i]:=avail;
  repeat
    readln(datafile, xpt[avail], ypt[avail], zpt[avail]);
    avail:=avail+1;
    until xpt[avail-1] = -999;
  end;
end;

procedure eyetoscreen(x,y,z: real; var sx,sy: real);
($
  Transform a point from x,y,z eye coordinates to x,y screen coordinates.
$)

begin
  sx:=0.83*140*(x/z)+140;
  sy:=96*(y/z)+96;
end;

procedure transform(var x,y,z: real);
($
  Transform a point into eye coordinates by multiplying a point (x,y,z,1)
  by the 4x4 viewing transformation.
$)

begin
  temp1:=x;
  temp2:=y;
  temp3:=z;
  x:=mat[1,1]*temp1 + mat[2,1]*temp2 + mat[3,1]*temp3 + mat[4,1];
  y:=mat[1,2]*temp1 + mat[2,2]*temp2 + mat[3,2]*temp3 + mat[4,2];
  z:=mat[1,3]*temp1 + mat[2,3]*temp2 + mat[3,3]*temp3 + mat[4,3];
end;

procedure multmat(var m3: matrix; m1,m2: matrix);
($
  Multiply matrices m1xm2 and return result in m3.
$)

var
  i,j: integer;
begin
  for i:=1 to 4 do
    for j:=1 to 4 do
      m3[i,j]:=m1[i,1]*m2[1,j] + m1[i,2]*m2[2,j] + m1[i,3]*m2[3,j]
        + m1[i,4]*m2[4,j];
    end;
  end;

procedure initmat(var m1: matrix);
($
  Initialize a 4x4 matrix to the identity matrix.
$)

var
  i,j: integer;
begin
  for i:=1 to 4 do
    for j:=1 to 4 do
      if i <> j
        then
          m1[i,j]:=0;
        else
          m1[i,j]:=1;
        end;
    end;
  end;

procedure getxproduct;
($
  This procedure is used to compute a vector that is an outward-facing
  normal to the face under consideration. The first three vertices of the
  face are used to give us two vectors which are crossed to give us the
  normal <n1 n2 n3>.
$)

begin
  v1:=xpt[start+1]-xpt[start];
  v2:=ypt[start+1]-ypt[start];
  v3:=zpt[start+1]-zpt[start];
  w1:=xpt[start+2]-xpt[start];
  w2:=ypt[start+2]-ypt[start];
  w3:=zpt[start+2]-zpt[start];
  n1:=v2*w3-v3*w2;
  n2:=v3*w1-v1*w3;
  n3:=v1*w2-v2*w1;
end;

procedure getdotproduct(var dotval: real);
($
  This procedure will compute the dot product of the normal vector to
  a face and the vector from the eye position to the base of the normal.
$)

```

Computer MAGAZINE PROGRAMS TYPED

We will type, and put on disk — the programs for your computer from at least 3 computer magazines.

ONLY **\$8²⁵** PER MONTH

We type for:

C64	APPLE
VIC-20	TRS 80
ATARI	T.I. 99
and others	

AMTYPE CORPORATION

7 days toll free
1 (800) 521-3200

CIRCLE 207 ON READER SERVICE CARD

We Help Bring Your Family Together

6 Types of Charts and Sheets
Indices
User Fields
Notes, Footnotes and Sources
No Limits
Adapts to Your Hardware
Comprehensive
Easy to Use
And Much, Much More

Send for brochure and sample printouts.

Family Roots includes detailed manual and 2 full diskettes of programs for your Apple II, IBM PC, Commodore 64 and CP/M.*

Other genealogy software also available.

Price \$185 plus \$3.50 postage. Satisfaction Guaranteed.

American Express, Visa & Mastercard Accepted

* Trademarks for
Apple Computer,
Inc., International

Business Machines,
CRM, Inc., & Digital
Research.



QUINSEPT, INC.

P.O. Box 216, Lexington, MA 02173
(617) 862-0404

CIRCLE 155 ON READER SERVICE CARD

ANNOUNCING creative computing's **1984 BUYER'S GUIDE**

TO PERSONAL
COMPUTERS &
PERIPHERALS



Advice you can trust on selecting personal com- puters, peripherals and electronic games

Unless you have the memory of a com-puter there's no way you can keep track of all the games, programs and peripherals available for your computer. And even if you could, you'd still have a problem figuring out what's best for your needs and how to get the most for your money.

That's why you need the *1984 Buyer's Guide to Personal Computers & Peripherals*. It's a comprehensive collection of product reviews and consumer-oriented shopping advice put together by the experts at *Creative Computing* magazine.

You'll get a rundown of what's new on the market. Analysis of new product performance, reliability, operation, applications, cost—even what kind of repair service you can expect. Easy-to-understand comparisons between different models. Tips on bugs and design problems. Plus "inside" information you won't get from manuals or salespeople.

Don't buy until you've consulted the *1984 Buyer's Guide to Personal Computers & Peripherals*! Order your copy today.

Send to: MA4C
Creative Computing Buyer's Guide
CN 1914, Morristown, NJ 07960

YES! Please rush me Creative Computing's *1984 Buyer's Guide to Personal Computers & Peripherals*. Enclosed is my check or money order for \$3.95 plus \$1 for postage and handling.

Mr./Mrs./Ms. _____
(please print)

Address _____

City _____

State _____ Zip _____

Please make check payable to Creative Computing Buyer's Guide. CA, NJ and NY State residents please add applicable sales tax. Price outside U.S.A. is \$6.

Hidden Surface, continued...

If this value turns out to be less than zero, the face under consideration is hidden, and need not be plotted.

```

begin
  temp1:=xpt[start];
  temp2:=ypt[start];
  temp3:=zpt[start];
  dotval:=n1*temp1 + n2*temp2 + n3*temp3;
end;

```

```

procedure drawface (faceno: integer);
($
  Draw a face of the object that has been found to be visible.
$)

```

```

var
  i: integer;
begin
  i:=where[faceno];
  eyetoscreen (xpt[i], ypt[i], zpt[i], x1, y1);
  moveabs (x1, y1);
  i:=i+1;
  while xpt[i] <> -999 do
    begin
      eyetoscreen (xpt[i], ypt[i], zpt[i], x1, y1);
      drawabs (x1, y1);
      i:=i+1;
    end;
end;

```

```

procedure xform3pts (face: integer);
($
  Transform first three points of a face so we can get a dot product and
  determine if the rest of the vertices need to be transformed.
$)

```

```

begin
  nextpt:=where[face];
  start:=nextpt;
  transform(xpt[nextpt], ypt[nextpt], zpt[nextpt]);
  nextpt:=nextpt+1;
  transform(xpt[nextpt], ypt[nextpt], zpt[nextpt]);
  nextpt:=nextpt+1;
  transform(xpt[nextpt], ypt[nextpt], zpt[nextpt]);
  nextpt:=nextpt+1;
end;

```

```

procedure xformrest;
($
  If the face is visible, transform the rest of the vertices.
$)

```

```

begin
  while xpt[nextpt] <> -999 do
    begin
      transform (xpt[nextpt], ypt[nextpt], zpt[nextpt]);
      nextpt:=nextpt+1;
    end;
end;

```

```

procedure drawpic;
($
  Draw the three-dimensional perspective view of the object (no clipping).
$)

```

```

var
  i: integer;
begin
  for i:=1 to numfaces do
    begin
      xform3pts(i);
      getxproduct;
      getdotproduct(dot);
      if dot >= 0
        then
          begin
            xformrest;
            drawface(i);
          end;
    end;
end;

```

```

procedure getviewmat;
var
  i, j: integer;
begin
  initmat(mat);

```



```
(* Translate origin to eye position *)
```

```
mat[4,1]:=-eyex;
mat[4,2]:=-eyey;
mat[4,3]:=-eyez;
initmat(t1);
```

```
(* Rotate about x-axis by 90 degrees *)
```

```
t1[2,2]:=0;
t1[3,3]:=0;
t1[3,2]:=1;
t1[2,3]:=-1;
multmat(t2,mat,t1);
mat:=t2;
initmat(t1);
```

```
(* Rotate about y-axis by an angle dependent on focus point *)
```

```
fx:=eyex-fx;
fy:=eyey-fy;
fz:=eyez-fz;
d1:=sqrt(fx*fx+fy*fy);
if abs(d1) > 0.0001
then
begin
t1[1,1]:=-fy/d1;
t1[3,3]:=-fy/d1;
t1[1,3]:=fx/d1;
t1[3,1]:=-fx/d1;
multmat(t2,mat,t1);
mat:=t2;
end;
initmat(t1);
```

```
(* Rotate about x-axis by an angle dependent on focus point *)
```

```
d2:=sqrt(fx*fx+fy*fy+fz*fz);
if abs(d2) > 0.0001
then
begin
t1[2,2]:=d1/d2;
t1[3,3]:=d1/d2;
t1[2,3]:=fz/d2;
t1[3,2]:=-fz/d2;
multmat(t2,mat,t1);
mat:=t2;
end;
initmat(t1);
```

```
(* Rotate about z-axis to rotate horizon *)
```

```
horizrot:=horizrot*pi/180.0;
t1[1,1]:=cos(horizrot);
t1[2,2]:=cos(horizrot);
t1[1,2]:=sin(horizrot);
t1[2,1]:=-sin(horizrot);
multmat(t2,mat,t1);
mat:=t2;
initmat(t1);
```

```
(* Invert the z-axis *)
```

```
t1[3,3]:=-1;
```

```
(* Scale according to d/s ratio *)
```

```
t1[1,1]:=ds;
t1[2,2]:=ds;
```

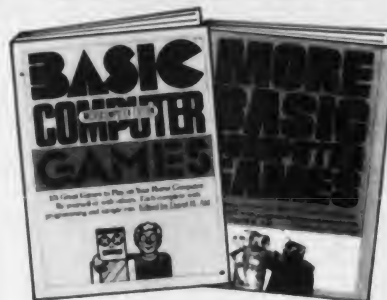
```
multmat(t2,mat,t1);
mat:=t2;
end;
```

```
begin (* Draw3d *)
```

```
writeln('starting...');
readln;
writeln;
write('Input x,y,z position of eye?');
readln(eyex, eyey, eyez);
writeln;
write('Focus point x,y,z?');
readln(fx, fy, fz);
writeln;
write('Input horizon rotation angle?');
readln(horizrot);
writeln;
write('Input scaling factor?');
readln(ds);
getviewmat;
initscrn;
drawpic;
read(ch);
end.
```

February 1984 © Creative Computing

GAME BOOKS FROM CREATIVE COMPUTING



BASIC COMPUTER GAMES, Micro-computer Edition, edited by David H. Ahl. Here's a great collection of 101 fascinating games, all written in easy-to-use Microsoft BASIC. Play Craps, Combat, Super Star Trek, Lunar LEM Rocket, Gomoko, Checkers, Boxing, Bowling—and 93 others! With an introduction, notes on Microsoft BASIC, and conversion instructions for other BASICs, 8 1/2" x 11", softcover, illustrated, with an index. 183 pp. \$7.95 (\$1.50) #6C

MORE BASIC COMPUTER GAMES, edited by David H. Ahl and Steve North. In this sequel to *Basic Computer Games* you'll find 84 challenging new games, complete with sample runs, program listings and illustrations. All run in Microsoft BASIC. Race your Ferrari, become a millionaire, joust with a knight, crack a safe, and more! Conversion table to other BASICs included. 8 1/2" x 11", softcover, illustrated, 200 pp. \$7.95 (\$1.50) #6C2

TRS-80 Microcomputer Edition, \$7.95 (\$1.50). #6C4

TRS-80 is a registered trademark of the Radio Shack Division of Tandy Corp.

CREATIVE COMPUTING PRESS Dept. MA1C
39 East Hanover Avenue, Morris Plains, New Jersey 07950

Send me the books listed below

ITEM NO.	QTY	TITLE	PRICE EACH	P&H* ()	TOTAL

Outside USA add \$3 for regular postage and handling per order

CHECK ONE:

☐ PAYMENT ENCLOSED \$ _____
☐ CHARGE MY: ☐ American Express ☐ MasterCard ☐ Visa
 (Charge and phone orders \$10 minimum.)

Card No. _____ Exp. Date. _____

Mr./Mrs./Ms. _____ (please print full name)

Address _____ Apt. _____

City _____

State _____ Zip _____

For faster service, CALL TOLL FREE: 800-631-8112.
 (In NJ call 201-540-0445)

Institutions only—purchase orders under \$50 not accepted.

ANNOUNCING

A LIBRARY OF SOFTWARE PROGRAMS FOR **APPLE II & IIe** COMPUTERS

A+DISK

M A G A Z I N E

Now you can build a library of programs for your Apple™ at a fraction of the usual cost

Each issue of A+ Disk Magazine provides you with up to 12 programs for as little as \$2.00 each.

A+ DISK MAGAZINE is making it easier than ever before to build a library of computer software for your Apple II Microcomputer. Because now you can save 34% on the programs you need to expand the use of your personal computer. Issue after issue, A+ DISK MAGAZINE gives you business and finance aids, utilities, subroutines, games, home and personal applications... all for as little as

\$2 per program.

And when you consider that many of today's most popular programs sell for \$50, \$60, \$80 and more, your savings can be *enormous*... much more than the cost of your subscription to A+ DISK MAGAZINE.

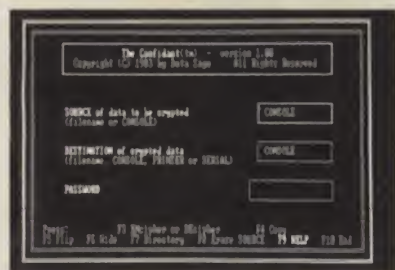
Along with your subscription to A+ DISK MAGAZINE, you'll receive



up to 12 thoroughly-tested, ready-to-run programs and files on a floppy disk. Complete with comprehensive, illustrated User Manual, **A+ DISK MAGAZINE** is easy, efficient, and very economical.

Here's just a sampling of what you can expect in every issue:

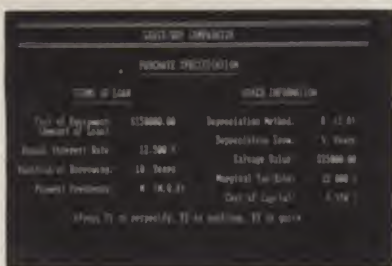
Programming tools: Create cross-reference listings for your



BASIC programs. Convert MBASIC™ program files to CBASIC™ format or reverse. Use your text editor on your BASIC programs. Convert data between BASIC and VISICALC® formats.

Business and finance aids: Compute loan payment tables. Calculate the Present Value and Internal Rate of Return for your investments. VISICALC templates for Real Estate, Lease/Purchase and Tax Shelter analysis. Create advanced pie, bar and line chart graphics.

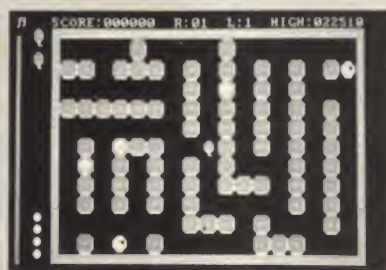
Home/personal applications: Whether you need your own income tax return helper... a personal cash flow analyzer... a speed reading trainer... proven ways to maintain a mailing list... or SAT test preparation aids, **A+ DISK MAGAZINE** has it all.



Utilities and diagnostics: **A+ DISK MAGAZINE** shows you how to use your Apple to simulate a conversational terminal with function key control of disk or printer logging... print graphics, screen images on your printer...

backup, copy, delete, un-delete or type files with simple menu commands... plus more.

Data files: From tax tables, to population statistics, from dictionaries to economic times series, **A+ DISK MAGAZINE** involves you as never before.



Games: Adventures! Strategies! Test your skill, intelligence and luck.

The latest software developments at your fingertips for a fraction of the cost.

There's no need to type listings into your computer. With **A+ DISK MAGAZINE**, all you do is boot the disk and go! The accompanying User Manual explains everything in clear, easy-to-understand terms. So you'll be able to run the programs as soon as you receive your first issue of **A+ DISK MAGAZINE**.

Save \$60 with this Introductory Offer. Get 6 issues of A+ Disk Magazine and save 34%

A+DISK

MAGAZINE

P.O. Box 2469
Boulder, Colorado 80322

YES. Please accept my subscription to **A+ DISK MAGAZINE** for 6 issues at the Special Introductory Price of just \$119 (less than \$20 per issue, as little as \$2 per program). I save 34% off the full price of \$179.

Check one: ☐ I enclose \$_____. (Residents of CA, CO, CT, DC, FL, IL, MA, MI, MO, NJ, NY State, and VT add applicable sales tax.)
☐ Please bill me.

Please charge to my credit card. ☐ American Express ☐ Visa ☐ MasterCard

Credit Card No. _____ Exp. Date. _____

Name _____

Address _____

City _____ State _____ Zip _____

8H062

MAIL NO-RISK COUPON TODAY—AND SAVE 34%!

Program Submissions

If you wish to submit a program for inclusion in future issues, please write to: **A+ DISK MAGAZINE**, Attn: Editor, One Park Avenue—Dept. 732, New York, N.Y. 10016.

Guarantee

- All programs are fully tested and guaranteed to run. Damaged or faulty disks will be replaced at no charge.
- If you wish to cancel a subscription, simply return the most recent disk in its sealed package and you will receive a full refund for this copy and all unmailed issues.

Product Specifications

Programs will run on Apple II computers using Apple DOS 3.3 and require a minimum of 64K. Most programs will be written in Apple-soft Basic—however some machine language code may be used.

Most programs will be written to run on both monochrome and color displays; however, some games and utilities may be specifically developed for color displays.

Programs and documentation are copyrighted by Ziff-Davis Publishing Company. All rights of reproduction in all forms and media strictly reserved.



Simple Screen Graphics With MSX Basic

David H. Ahl

Would you like to be able to draw borders easily, plot a projectile, or make fancy geometric patterns? With the rich library of graphics commands built into MSX Basic, it is easy, but it is a bit different from some other computers.

MSX Basic has three screen modes, appropriately called SCREEN 0, SCREEN 1, and SCREEN 2. SCREEN 0 is the text mode and permits only limited graphics using the LOCATE command. Using LOCATE, you can move the cursor to any point on the screen ranging from 0 to 36 in the horizontal direction, and 0 to 23 in the vertical direction. Remember, vertical locations are numbered from the top of the screen to the bottom.

The LOCATE command is always used with the PRINT command to put something on the screen. As a result, the character printed is actually placed on the screen one location to the right of the position defined in the LOCATE command. Thus, if you type the commands:

```
LOCATE 10,15: PRINT "X"
```

the X will be located at screen location 11,15. Since LOCATE permits only very low resolution graphics, we will concentrate on SCREEN 1 and 2.

The horizontal (x) and vertical (y) coordinates used with SCREEN 1 and 2 are the same. X ranges from 0 to 255, and y ranges from 0 to 191. However, the main graphics command, PSET, illuminates a single pixel on SCREEN 1 and a 4 x 4 block of pixels on SCREEN 2. Thus, the effective resolution of SCREEN 1 is 256 x 192, and of SCREEN 2 is 64 x 48.

Draw A Border

You can draw a point anywhere on the screen using the PSET command. Try illuminating the center pixel on the screen using both screen modes. Here is a program to do this for mode 1. Change line 10 to SCREEN 2 and see what happens.

```
10 SCREEN 1
20 PSET (128,96)
30 GOTO 30
```

Now, how would you draw a line? One way would be to use a series of PSET statements, for example:

```
10 SCREEN 1
20 PSET (1,23)
30 PSET (2,23)
40 PSET (3,23)
50 PSET (4,23)
60 PSET (5,23)
610 PSET (60,23)
620 PSET (61,23)
630 PSET (62,23)
640 PSET (63,23)
650 GOTO 650
```

Obviously, this is very inefficient and cumbersome. Consider this alternative:

```
10 SCREEN 1
20 FOR X=0 TO 255
30 PSET (X,23)
40 NEXT X
50 GOTO 50
```

Now, let us say you want to draw a border. As long as we are letting X vary from the left to right of the screen, why not draw two horizontal lines at once, one at the top and one at the bottom? Here is a modification of our previous program to do this:

```
10 SCREEN 1
20 FOR X=0 TO 255
30 PSET (X,0)
35 PSET (X,191)
40 NEXT X
50 GOTO 50
```

But we would also like to draw vertical borders, too. We can add two statements to do so. Run this program and see what happens.

```
10 SCREEN 1
20 FOR X=0 TO 255
30 PSET (X,0)
35 PSET (X,191)
36 PSET (0,X)
37 PSET (255,X)
40 NEXT X
50 GOTO 50
```

It works, but the vertical lines finish before the horizontal ones do. Why? Because, the vertical height of the screen is only

192 pixels, and the width is 256. Thus, we should put a line in our program to test for values out of range. Renumber your program using RENUM 10 and add line 45 to test for vertical values over 191:

```
45 IF X>191 THEN 70
```

The final program is one of the shortest ways to draw a border. Remember it and use it when you need a border.

```
10 SCREEN 1
20 FOR X=0 TO 255
30 PSET (X,0)
40 PSET (X,191)
45 IF X>191 THEN 70
50 PSET (0,X)
60 PSET (255,X)
70 NEXT X
80 GOTO 80
```

Now, let's try this program with SCREEN 2. It works, but we can make it run much faster. Remember, each PSET lights up a 4 x 4 pixel block. Hence, we can change our FOR loop in line 20 to use a step size of four.

On screen mode 2, you can also add color. The third variable in the PSET statement is color. Most MSX Basic computers give you a choice of 15 colors. Color 0, transparent, is not really a color, so realistically your palette consists of 14 colors. Here is a program to draw a border in color 2 (medium green).

```
10 SCREEN 2
15 C=2
20 FOR X=0 TO 255 STEP 4
30 PSET (X,0),C
40 PSET (X,191),C
45 IF X>191 THEN 70
50 PSET (0,X),C
60 PSET (255,X),C
70 NEXT X
80 GOTO 80
```

Multiple Borders

In the previous program, instead of having the border print at the edges of the screen, it is possible to let the non-X value vary. We will let the distance or increment from the edge of the screen be I. The value I can be used as the coordinate for the top and left side, however, the right side must be defined as 255-I and the bottom as 192-I.

Here is a program that uses these relationships to draw a series of borders which start at random points in the upper left quarter of the screen. Note that the test to see if the maximum y value has been exceeded has changed somewhat. Can you explain why?

```
10 SCREEN 2
20 C=INT(15*RND(1))
30 I=INT(92*RND(1))
40 X2=255-I
50 Y2=191-I
60 FOR X=I TO X2 STEP 4
70 PSET (X,I),C
80 PSET (X,Y2),C
90 IF X2-X<=64 THEN 120
100 PSET (I,X),C
110 PSET (X2,X),C
120 NEXT X
130 GOTO 20
```



Is your Apple's 6502 processor chip a little overworked lately? Have you been eyeing one of those new, 16-bit systems? But you don't want to give up all your Apple programs ...

Add the powerful 16-bit 8088 processor to your Apple with ALF's Processor Card. Let the 6502 and 8088 work together to tackle your toughest problems—like speeding up your Applesoft and Apple Pascal programs. With the Processor Card, you can use the CP/M™ 86 or MS-DOS™ operating system to run the latest 16-bit software, including many IBM PC programs.

64K or 128K of high-speed memory is available for ALF's Processor Card. Use the Processor Card with 128K as a fast disk emulator or to view sixteen hi-res images in under a second. Or run Basic, C, COBOL, or Pascal with 16-bit performance!

The ALF Processor Card is just \$395 (Applesoft speed-up software included). See your Apple dealer today, or contact ALF for more information.

Trademarks: "Apple": Apple Computer, "CP/M": Digital Research, "MS-DOS": Microsoft.

ALF

ALF Products Inc.
1315F Nelson St. Denver, CO 80215
(303) 234-0871 Telex 4991824

MSX Graphics, continued...

As you run this program, you will notice that many of the borders do not join correctly in the lower right corner. Why not? It is because the border may start at any location as defined by the random number function in line 30, but 4 x 4 blocks are being illuminated and the last one may be left off. There are several ways to correct this. Try to devise at least two ways.

One way to correct the above problem is to make sure the random number is a multiple of four. Simply substitute this line 30 for the one in the program, and all will be fine.

```
30 I=4*INT(23*RND(1))
```

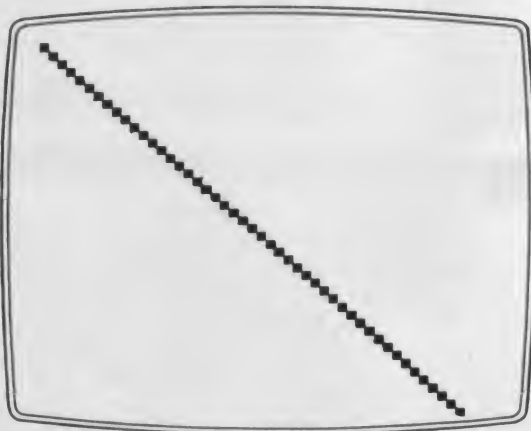
Bouncing Ball

Let us start with just four statements, one to give us a starting point for the plot of a bouncing ball, one to plot the ball, and one to repeat the plot.

```
10 X=8:Y=8
50 SCREEN 2
160 PSET (X,Y)
190 GOTO 160
```

Well, that is certainly a long way from bouncing. We can get the ball moving with these lines:

```
20 I=4:J=4
90 X=X+I
100 Y=Y+J
190 GOTO 90
```

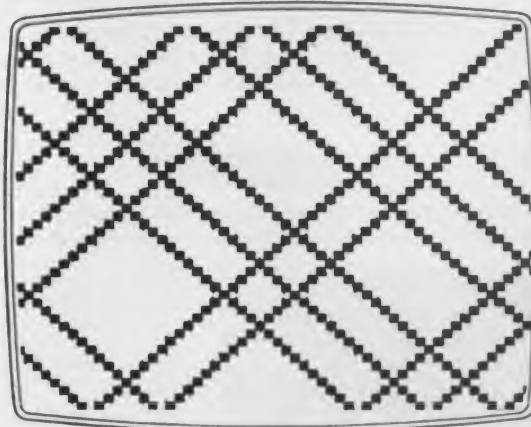


We are off to a good start, but unfortunately the ball rolls right off the bottom of the screen. Hence, we must add four IF statements to test for the screen edges. Depending upon the values in these statements and the starting point of the ball, several things can happen. Most common is for the plot at some point to start retracing a previous line. We used trial and error to choose these values: they are not the only ones that will work to eliminate line retracing. Try other starting points in line 10 and screen edge points in lines 110 to 140 and see what happens.

```
110 IF X>=254 THEN I=-I
120 IF X<=1 THEN I=-I
130 IF Y>=192 THEN J=-J
140 IF Y<=1 THEN J=-J
```

Would you like a ball that changes color? If so, you can add the following line 150:

```
150 C=INT(15*RND(1))
160 PSET (X,Y),C
```



You will find that this line slows the program down a good deal. Another interesting way to get color is to relate it to the x or y value. Here is a line that works nicely:

```
150 C=Y/13
```

While this program produces pretty patterns, it is hardly a bouncing ball. The problem is that it does not erase the previous ball position when it draws a new one. On our computer, these lines will do that. Our computer (a SpectraVideo 328) uses medium blue (color 4) as a background color, so plotting a point in this color is the same as erasing a point in another color. The PSET command can also be used to erase an illuminated pixel or block.

```
70 C=4
80 PSET (X,Y),C
190 GOTO 70
```

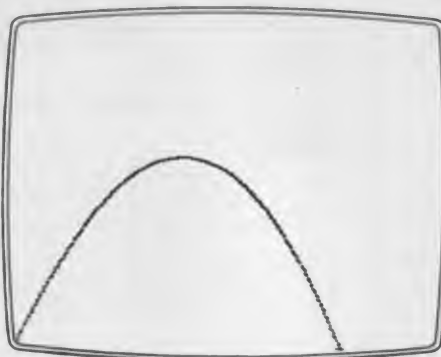
Now the program works as it ought to. You may find that the ball moves too fast to be seen. If so, you can put in some sort of delay after line 160. We have added a few lines to let the user select a bouncing ball or a continuous line (which produces the pattern we saw earlier). If you want a sound when the ball hits the edge of the screen, you can add a BEEP in lines 110 through 140. Here is our final program.

```
5 DEFINT C, I, J, X, Y
10 X=2:Y=2
20 I=4:J=4
30 INPUT "Leave trail (Y or N)";A$
40 COLOR 15,15
50 SCREEN 2
70 C=4
80 PSET (X,Y),C
90 X=X+I
100 Y=Y+J
110 IF X>=254 THEN I=-I :BEEP
120 IF X<=1 THEN I=-I :BEEP
130 IF Y>=192 THEN J=-J :BEEP
140 IF Y<=1 THEN J=-J :BEEP
150 C=Y/13
160 PSET (X,Y),C
180 IF A$="Y" OR A$="y" THEN 90
190 GOTO 70
```

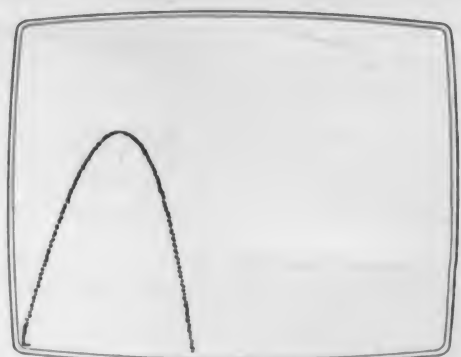
When a trail is left, the plot eventually fills in every other screen location. How could you modify it to fill in every location? There are several ways to accomplish this, some of which produce more interesting effects than others. Hint: try doing it with a random variable.



Output from projectile plotter before correcting for vertical distances being measured from the top of the screen downward.



Projectile plotter with input angle of 65 degrees.



Projectile plotter with input angle of 78 degrees.

Plot A Projectile

Let's say we want to plot the motion of a projectile from a gun on the left of the screen to a target on the right. Let's start by setting the screen mode and plotting a point.

```
40 SCREEN 1
130 PSET (X,Y)
```

What point do we plot? From physics, do you remember the equations for the horizontal and vertical positions of an object (projectile, ball, arrow, etc.) in the absence of air resistance?

They are:

$$X = V \cdot \cos(a) \cdot t$$

$$Y = V \cdot \sin(a) \cdot t - \frac{1}{2} \cdot g \cdot t^2$$

For a complete discussion, turn to any physics book or the section on projectile motion in *Computers in Science and Social Studies*.

The maximum range of a gun is obtained with a firing angle of 45 degrees. Let's say that the gun has a muzzle velocity (V) of 1000 feet per second. The acceleration due to gravity (on Earth) is 32 ft/sec/sec. Then, the time until the projectile returns to Earth is given by the formula:

$$T = \frac{2 \cdot V \cdot \sin(a)}{g} = \frac{2 \cdot 1000 \cdot .707}{32} = 44.2$$

And the maximum range is:

$$R = \frac{V^2}{g} = \frac{1000^2}{32} = 31250$$



Let Colonel Byte take your child on a trip through Cybernia

They'll learn all about computers along the way!

Growing up in the computer world will be easier if your child understands computers. And there's no better place to start than with the computer that's in your home—and with the help of this delightful book.

Computer Parade reads like a story book. Yet it actually teaches the basics of computer operation.

Computer Parade traces the adventures of Katie and her brother after they fall into the family computer. Once inside the computer, they find themselves in the imaginary land of Cybernia where they

meet Colonel Byte. Colonel Byte takes them to a computer parade, where they learn how computer music is made. All along their fanciful journey, the threesome encounters friendly and ferocious dragons, computer bits, eeks and aaks. And of course they're always on the lookout for program bugs.

Any youngster age 4-10 will delight in *Computer Parade*. It's easy to read and richly illustrated in full color.

Help your child grow up computer literate by ordering your copies now.

MAIL TODAY TO:

CREATIVE COMPUTING PRESS, Dept. MA2H 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me _____ copies of *Computer Parade* for \$9.95 each, plus \$2.00 shipping & handling per book.

Total Amount \$ _____

☐ Payment Enclosed. (CA, NJ and NY State residents please add applicable sales tax.)

☐ CHARGE MY:

☐ American Express ☐ MasterCard ☐ Visa

Card # _____ Exp. _____

For faster service, PHONE TOLL FREE:

800-631-8112

(In NJ only: 201-540-0445)

Signature _____

Name _____ (please print)

Address _____

City/State/Zip _____

*Outside U.S., add \$3 for shipping and handling.

☐ Check here to receive a FREE catalog of computing books, magazines and guides.

Also available in your local bookstore or computer store.

MSX Graphics, continued...

Since this will not fit on the screen, we must divide the horizontal distance (31250) by a constant (125). This gives a maximum horizontal distance of 250 pixels, which fits nicely on the screen.

On most computers, the distance between horizontal and vertical pixels is not the same. In other words, if you plotted a square 100 pixels on a side, it would not actually be square. To make it square, you have to multiply the vertical distance by 1.2.

We have combined all of the information above and put it into our program. Try this on your computer.

```
10 A=45
20 V=10000 :G=32
30 D=180/3.1415926#
40 SCREEN 1
50 CX=V*COS(A/D)
60 CY=V*SIN(A/D)
80 FOR T=0 TO 44.2 STEP .2
90 X=CX*T
100 Y=CY*T-16*T*T
110 X=X/125
120 Y=Y/125*1.2
130 PSET (X,Y)
140 NEXT T
150 GOTO 150
```

In the program, the variable D is a factor that converts degrees into radians, which is what Basic requires. CX and CY are constants for each firing angle.

What happened when you ran the program? It should work except the plot is upside down. But of course: vertical distances on the computer are measured from the top down so we must make a simple correction:

```
120 Y=192-(Y/125*1.2)
```

Now, let us modify the program to accept any firing angle for our gun. You need add only a few lines.

```
10 INPUT "Angle of gun":A
70 T1=2*CY/G
```

Experiment with this program. Try different firing angles. Try to tighten up the code and make it faster. Here is one approach.

```
10 INPUT "Angle of gun":A
20 V=10000 :G=32
30 D=180/3.1415926#
40 SCREEN 1
50 CX=V*COS(A/D)/125
60 CY=V*SIN(A/D)
70 T1=2*CY/G
80 FOR T=0 TO T1 STEP .2
90 X=CX*T
100 Y=192-9.6E-03*(T*(CY-16*T))
110 PSET (X,Y)
120 NEXT T
130 GOTO 130
```

See if you can make this program into a game in which the player on the left must hit a target on the right.

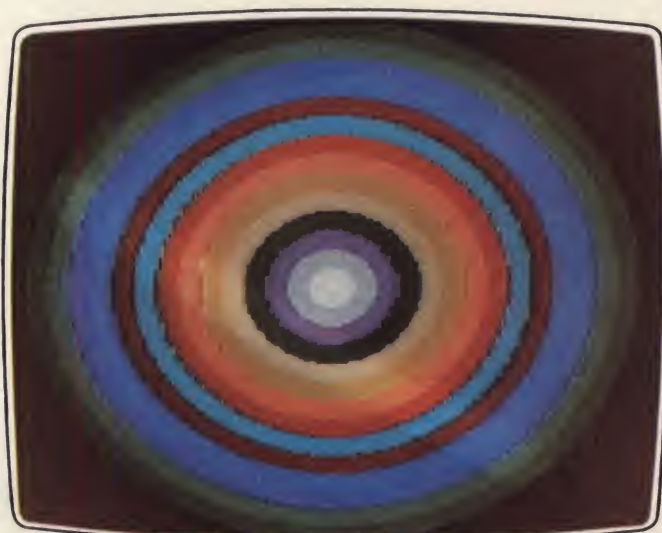
Explosions

Here is a short little routine to produce marvelous multi-colored explosions. You can easily figure out how it works, but can you add interesting sounds?

```
200 CLS
210 A=INT(15*RND(1))
220 B=INT(15*RND(1))
230 COLOR A,B
240 FOR Z=1 TO 10*B:NEXT
250 GOTO 210
```

Do you really need line 210? Of course not! In fact, the routine works much better if you simply put in:

```
210 A=0
```




Concentric circles with 14 colors.

Circles and Targets

MSX Basic has a generalized CIRCLE command built in. By generalized, we mean that it actually can draw a circle, ellipse, or arc with any center and any aspect ratio. For now, we will stick to circles. Let us draw a concentric ring of circles and fill in each one with a different color.

We will put the center of each circle at the center of the screen (128,96) and will make each one of the circles 7 pixels smaller in radius (I) than the preceding one. We will step through the 14 colors painting each one with a different color. The program to do this takes only nine lines.

```
10 SCREEN 1
20 COLOR 1,1,1
30 C=2
40 FOR I=98 TO 1 STEP -7
50 CIRCLE(128,96),I,C
60 PAINT(128,95),C
70 C=C+1
80 NEXT
90 GOTO 90
```

The next article in this series will discuss plotting various functions, the Sierpinsky curve, polygons, and spirals. 

**IT'S SIMPLE.
CALL & SAVE MONEY!**

*** 1-800-841-0860 ***

**DIRECT MARKETING COMPUTERS AND
EQUIPMENT TO SAVE YOU MONEY!**

SINCE 1978

**TRS-80
COMPUTERS**

• PURE RADIO SHACK EQUIPMENT •

UP TO **20%**
AND MORE
DISCOUNT

*****CALL FOR PRICES***
ON COMPLETE LINE**

PRINTERS AND EQUIPMENT

**EPSON
OKIDATA**

**SCM SMITH
CORONA**

RB ROBOT

**C
A
L
L**

**star
MICROELECTRONICS**

C. Itoh

Hayes

Novation

CALL

**WE SELL IBM
P.C. COMPATIBLES**

Since 1978

- PIONEER IN DIRECT TO CONSUMER SALES OF MICRO COMPUTERS AND ELECTRONICS
- NAME BRAND PRODUCTS
- LARGE INVENTORIES
- NEXT DAY SHIPMENT ON MOST PRODUCTS

FREE UPON REQUEST

- DISCOUNT PRICE LIST AND INFORMATION KIT
- COPY OF MFR'S WARRANTY
- PRICES AND PRODUCTS ARE SUBJECT TO CHANGE WITHOUT NOTICE



**Micro Management
Systems, Inc.**

2803 Thomasville Road East
Cairo, Georgia 31728
(912) 377-7120

#3

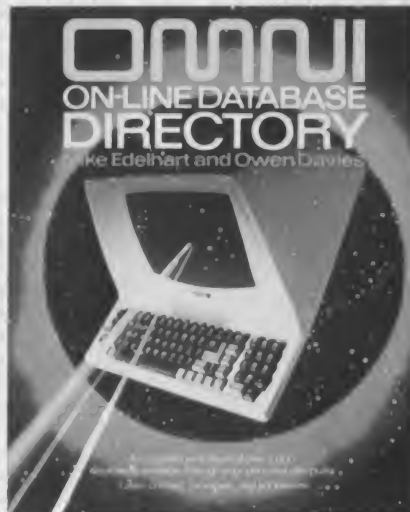
CIRCLE 141 ON READER SERVICE CARD

**B. Dalton
BOOKSELLER**

The Source for Computer Books

OMNI ON-LINE DATABASE DIRECTORY

Mike Edelhart & Owen Davies



Make the most of your personal computer with this comprehensive guide to over 1000 databases, their content and their uses.

- Access information; subscribing
- Using a personal computer with a database
- Choosing modems and setting up phone links
- Suppliers' addresses
- Content and use evaluation
- Solutions to frequent problems
- Computer glossary

Macmillan \$10.95 Paperback

Now Available at B. Dalton Bookseller

**B. Dalton
BOOKSELLER**

Selection • Service • A Store Near You

700 Stores Nationwide. Check Your Yellow Pages.

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

☐ Check Money Order Enclosed
☐ VISA ☐ MasterCard ☐ American Express

Card No. _____ Exp. Date _____

Book Title **OMNI ON-LINE DATABASE DIRECTORY** Price **\$10.95 ea.** Qty. _____

Please send \$1.75 for postage and handling.
Please add appropriate sales tax.

B. Dalton Bookseller
9340 James Ave. S.
Minneapolis, MN 55431

CIRCLE 188 ON READER SERVICE CARD



Notebook/Portable Computing

Our Notebook Computing column this month is an excerpt from the book, "Exploring Your TRS-80 Model 100" by Bill Machrone. This will be available shortly from Creative Computing Press. We selected the section on speeding up loop calculations in Basic because it is applicable not only to the Model 100, but to virtually every computer that uses Basic.—DHA

Basic is the heart of your Model 100, in more ways than one. First, it is an easy-to-learn language with great power for calculation, screen display, file handling and more. Second, the facilities coded into Basic are shared by other programs in the ROM. Here you will learn how to maximize the power and speed of Basic and use many of its features more effectively, through the examples provided.

Loops

Looping (repeatedly performing a task) is the single most powerful and useful task a computer can do. Unlike us, a computer never gets bored. We, however, occasionally get bored waiting for the computer to finish its calculations. Therefore, you should do everything in your power to make loops run as fast as possible. Below are several ways to "get the lead out."

Try this on your machine:

```
10 TIMES = "00:00:00"  
20 FOR X = 1 TO 10000  
30 NEXT X  
40 PRINT TIMES
```

Bill Machrone is technical editor of *PC: The Independent Guide To IBM Personal Computers*.

Bill Machrone

That's right, we are just asking the machine to count to ten thousand, and using the built-in clock to time it: Run the program, and you will find that it takes about 30 seconds to execute. That is much faster than you or I could count to ten thousand, but not as fast as it could be. Add this line to your program and run it again!

5 DEFINT X

The execution time drops to about 10 seconds. What's the difference? Basic automatically assumes that all numbers are floating-point or double precision numbers. That means that all calculations are carried out to 14 places and can have a range of 10^{62} to 10^{-64} . That is a lot of overhead for just counting from 1 to 10,000 or in other situations in which you don't need decimal places.

The 80C85 microprocessor inside your Model 100 can handle integer addition at least three times faster than floating point. DEFINT DEFINES INTEGERS. We declared X to be an integer, which in the case of Basic, means that it is a whole number (no decimal places) between -32768 and +32767. You can count only up to 32767 if you start at one, but if you need a larger fast loop, you can start at negative values all the way down to -32768 and thus extend your fast looping range to over 65000.

If, in the extreme case, you need to do something more than 65000 times, it is still faster to nest two integer loops (put one inside the other) than to use a floating point number to control the loop.

There is another level of numeric precision available, single precision. While it does floating point arithmetic too, it uses less space for the numbers as it stores them in the Model 100 memory. It also has a numeric range of 10^{62} to 10^{-64} , but is only marginally faster than double precision in our example, completing the count in about 27 seconds.

There is another way to speed up our routine. Basic is an interpretive language, meaning that it must read and evaluate (understand) each character that you type. Some of its operations are implicit, meaning that it will do the right thing whether you have the "right" thing in your program or not.

A perfect case in point is the NEXT statement in a FOR-NEXT loop. You can speed up the program dramatically by simply eliminating the X in line 30:

```
10 TIMES = "00:00:00"  
20 FOR X = 1 TO 10000  
30 NEXT  
40 PRINT TIMES
```

For an integer loop, the execution time drops to 6 seconds, a 40% improvement! Why should one character make so much difference? It is all in the way Basic does things.

First, when you say FOR X = 1 to 10000, Basic sets up a counter in memory. NEXT is the trigger that tells it to add one more to the counter and check to see if it has satisfied the requirement by having completed the count. When you have an X (or any variable name) on the NEXT line, it calls in another routine which simply locates variables by name in memory. Easy enough, but when you do it 10,000 times, the overhead adds up.

You can shorten the execution of FOR-NEXT loops on any version of Microsoft Basic with this technique, but the speedup is more dramatic on the Model 100 than most. We mentioned nested loops briefly above. Let's look at an example:

```
10 DEFINT X,Y
20 FOR X = 1 TO 100
30   FOR Y = 1 TO 100
40   NEXT
50 NEXT
```

When you run this program, you will find that it takes only a second longer to count to 10,000 with two loops. Using NEXT X and NEXT Y costs the same four second penalty that it did above. Note the indented structure of the program. This is done to keep things clear in terms of what happens when.

While indented structure is relatively unimportant in short examples like this, it is a very good habit to get into. In a normal program there would probably be many lines between the FOR and NEXT statements. Keeping them indented keeps you organized.

But, you may ask, if Basic has to parse (examine) every character on each line, don't those extra spaces slow the program down? Well, yes and no. They do, but not by much. Take the two examples below:

```
10 DEFINT X,Y
15 TIMES = "00:00:00"
20 FOR X = 1 TO 1000
30   FOR Y = 1 TO 100
40   NEXT
50 NEXT
60 PRINT TIMES
```

```
10 DEFINT X,Y
15 TIMES="00:00:00"
20 FORX=1TO1000
30 FORY=1TO100
40 NEXT
50 NEXT
60 PRINTTIMES
```

Which would you rather debug? This double loop is slightly different from the one presented earlier; the outside or X loop counts to 1000 instead of 100. The top one takes 1:17 to complete and the bottom takes 1:14. Do you have three seconds to spare next time you have to do something a hundred thousand times? The bottom line is that your program might as well be readable, because the impact on their performance will be negligible.

By the way, use a tab instead of a bunch of spaces when you indent. It represents only one character that Basic has to parse instead of multiple spaces,

but it looks like eight spaces on the screen.

There is no faster way than a FOR-NEXT loop to control things in Basic. For instance, the following code,

```
10 DEFINT X
20 X = 10000
30 X = X - 1
40 IF X > 0 THEN GOTO 30
```

takes more than a minute to execute. Subtraction or counting down, by the way, is a few seconds faster than addition or counting up.

Suppose you want to avail yourself of the fastest looping available but don't know how many times you will have to go through the loop to get the result you want?

This can be the case in iterative problem solving, as in solving an equation or in string searches. For example, you can use Basic to search a file for a specific character. Normally, you would do this with a WHILE loop, a feature not available in Model 100 Basic.

The alternative is to set a TO value greater than the number of times you are likely to need to go through the loop. When you find the value of whatever you are looking for, set the loop variable to the control variable. That way, the loop ends "naturally," instead of being interrupted.

Basic can then perform "garbage collection" on the "used" variables and re-use them elsewhere. Besides, it is always good form to have a single exit point from a routine, avoiding "spaghetti code."

Looping until z is found in a file:

Good Example:

```
10 FOR LOOP = 1 TO 32767
20 TEST$ = INPUT$(1,1)
30 IF TEST$ = "z" THEN LOOP
   = 32767
40 NEXT
50 Program continues...
```

Bad Example:

```
10 FOR LOOP = 1 TO 32767
20 TEST$ = INPUT$(1,1)
30 IF TEST$ = "z" THEN 50
40 NEXT
50 'Program continues...
```

In the second example, the loop is never satisfied. In fact, if another NEXT is encountered in the program (without an intervening FOR statement), the loop will begin executing where it left off. Don't get any ideas about how you can use this "feature." It is not the way to do things. ENC

WHERE DO YOU FIND MICRO- COMPUTER MAIL-ORDER BUYERS?

In A+

—our new publication catering to the enormous market of Apple owners, users and buyers.

In Computers & Electronics—the "grandfather" of them all and the largest circulating computer magazine in the world also provides monthly coverage of all forms of electronic equipment.

In Creative Computing—the number one magazine of computer applications and software.

In Digital Review—The foremost magazine devoted to serving the fast-growing DEC microcomputer community.

In Microsystems—an advanced journal for microcomputer professionals who need high-level information.

In PC—the "must-read" magazine for IBM Personal Computer owners, users, and buyers.

In PC Tech Journal—where more sophisticated and influential IBM users find ways to stretch their systems to new technological limits.

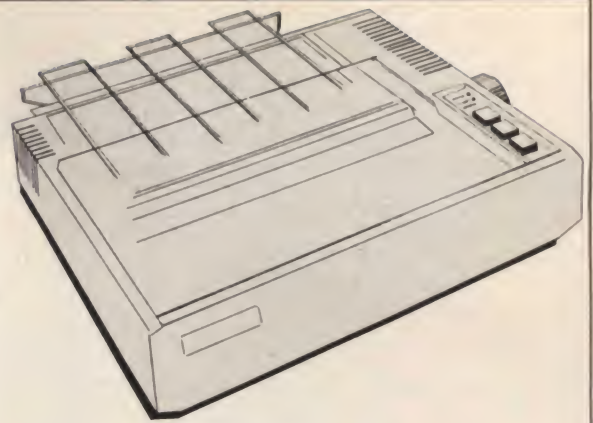
Our computer magazine group lets you talk to your prospects selectively in classified ads and/or directory listings that can be yours for as little as \$2.00 per word! Why not run in a combination of our magazines next month—and enjoy high response?

Phone us now for rates, sizes, and ad options by title.

Classified Advertising
ZIFF-DAVIS PUBLISHING COMPANY
Consumer Computers &
Electronics Magazine
Division

CALL 725-4215

Print About Printers



This month, Print about Printers should perhaps be retitled, "Plots About Plotters." All of the plotters we have evaluated to date have been flat bed units. Thus, we were interested in the Strobe plotter which uses a drum mechanism and the Laser unit which uses a roller (or small drum). The Strobe units are full-function plotters selling in the near \$1000 range while the Laser PP-40 at \$199 is one of the least expensive plotters available.

Strobe Model 260 Plotter

The Strobe Model 260 is an eight-pen drum plotter designed for use with a wide variety of microcomputers. Strobe also manufactures two one-pen plotters, the Model 100 and Model 200. Most of this review will apply to all three plotters.

David H. Ahl

The 200 series of plotters uses 8 1/2" x 11" paper and has a plotting area of 8" x 10 3/4". Accuracy and step size are both 0.002" (or 0.05 mm). As a result of the drum design, the plotter is a relatively compact 16.8" x 10.3" x 4.1".

In addition to its primary function as a plotter, the unit can be used as a digitizer (reading points) as well.

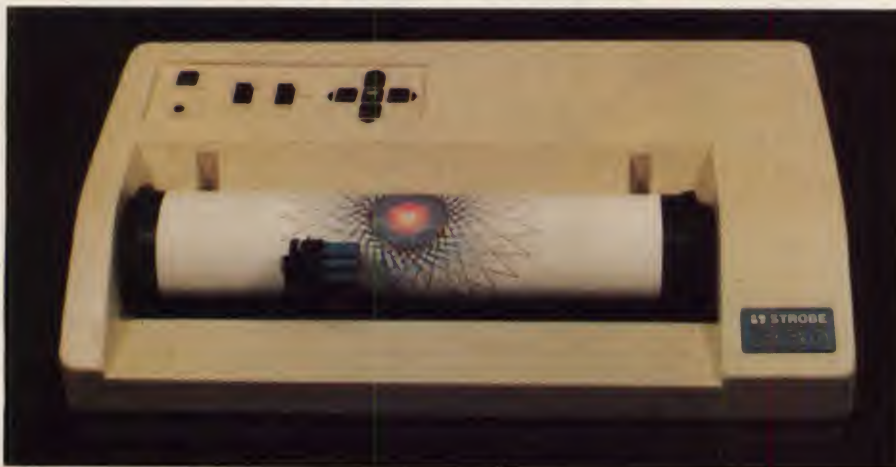
Setting Up

As it comes out of the box, the 260 is one of the most complete packages we have seen. The carton includes the plotter itself, pen assembly, manual, and packet of 50 sheets of paper. As we had ordered the Apple version, also included was an interface card and six-foot connecting cable.

The plotter is easy to install: just plug in the power cord and RS-232 interface cable, set the baud rate and parity switches, and you are ready to go. Or so we thought. Although we had ordered the Apple card, we first tried the plotter with a NEC 8201, the computer we have used for our previous three plotter evaluations.

We connected the computer to the plotter with a reversed RS-232 cable (2 to 3, 4 to 5, 6 to 20, etc.) as described in the manual. Incidentally, the description of this interface in the Strobe manual is one of the best we have ever seen. Indeed, the manual has one of the only clear descriptions around of the various methods of software handshaking (Xon-Xoff and Enquire/Acknowledge).

Unfortunately, the manual was of little help when the plotter head moved just a tad and then refused to do anything else. After three hours of experi-



Strobe Model 260 Plotter.



Pen assembly rotates to bring selected pen into position.

The new pacesetter in professional printers.

The economical dual-speed Radix-15 multi-function printer.

With a fast and furious work pace, a highly flexible printer is crucial. That printer is the new Radix-15. Watch it take your work and run with it.

It's dual speed! At 200 cps Radix fires out a superbly refined dot matrix printout. At 50 cps it prints professional near-letter quality. So now you can go from spreadsheets to memos at the flip of a switch or at your computer's command.

It's multi-functional! In either mode Radix-15 quickly adapts to your needs. There's serial and parallel interface. Memory storage with a 16K buffer. Responsive throughput to help you use

time more efficiently. Bi-directional performance. Friction and tractor feed. An automatic sheet feeder for letterheads and a short form tear-off for preprinted forms. Plus, the freedom to underline, set vertical and horizontal tabs and print a huge variety of type faces.

It's economical! And not only does Radix give you 2 printers in 1, it also gives you a price performance as outstanding as its working performance.

The professional Radix-15. Using the ever-changing beat of business to your advantage. And that's what being a pacesetter is all about!

star
MICRONICS • INC.

THE POWER BEHIND THE PRINTED WORD.

Computer Peripherals Division

P.O. Box 612186, Dallas/Ft. Worth Airport, TX 75261 (214) 456-0052

CIRCLE 167 ON READER SERVICE CARD





Notched rubber belts and gears are used to rotate the drum.



Top panel has only eight controls.

mentation with baud rates, parity, reversing connections, new cables, and the like, we gave up and hooked it up to the Apple. Same problem.

So we called Strobe and a helpful customer service person, Dave Golden, talked us through a setup procedure. Still, no go. In desperation, we took the cover off and reseated all the chips and connectors. Lo and behold, upon power up, it worked fine. Lesson: even with the best packaging, shipping can be rough on delicate electronic equipment.

Incidentally, the parity slide switch is neither labeled nor described in the manual. For the information of future Strobe customers, up is even parity, center is none, and down is odd.

Paper loading on a drum plotter is somewhat more awkward than on a flat bed unit, although with a bit of practice it becomes easier. The plotter uses standard letter-size paper; however, Strobe recommends paper with a smooth, non-porous surface. This commonly known as coated stock and is similar to the stock on which most magazines are printed. Ink takes longer to dry on this type of paper, so you must be careful not to touch a finished plot for a minute or two after the last line is drawn.

The one-color plotters can accept several commercial pens such as the Pilot Razor Point or Spree Roller pen. The Model 260 comes with an eight-pen assembly which must be obtained directly from Strobe. Unfortunately, the manual is written for the Model 200 and the section of Pen Loading gives no clue as to how to load the eight-pen assembly. Back on page 4-20, with the description of the Select Pen command, a diagram shows the pen assembly. From this, we deduced that the assembly should be loaded with the black pen pointing toward the plotter drum.

Controls And Buttons

On the top of the plotter are a red LED power indicator, two rocker

switches, and six buttons. The switches select whether the plotter is on or off line and the pen position (up or down). The buttons move the pen manually in any of four directions or to the home position. One button, marked Start/Enter is used to designate manually the point at which the pen is initialized.

For normal plotting, most of these manual controls will not be used, but they are handy in case you want to put several small plots on the same sheet of paper (although this, too, can be done in software rather easily). These controls, of course, are necessary for using the unit as a digitizer.

Plotter Commands

Commands are sent to the plotter as you would send them to any RS-232 device. Although the commands are described in detail in the manual, a major shortcoming is the total absence of examples. Moreover, the Apple demo program is in machine language, which is of no help if you are trying to figure out which of the following statements to use to move the pen:

```
PRINT #1,PA 1000,1000,0,1000;
PRINT #1,"PA" 1000,1000,0,1000;
or
PRINT #1,"PA 1000,1000,0,1000;"
```

The commands fall into three major groups: communications, device control, and graphics plotting. The communica-

tions commands are used to set the handshake mode (one hardware and three software modes), turn the plotter on and off, reset the plotter, and read the amount of buffer space remaining. The plotter has a 512-byte buffer which you normally won't have to worry about. However, if you like to be in control of absolutely everything, you can bypass the normal handshaking and devise your own approach with the buffer commands.

There are 25 graphics instructions which provide the means to raise and lower the pen, change pen colors, draw alphanumeric strings and plotter symbols, and create graphics.

A plot unit is 0.002" which means that the plot dimensions on a standard sheet of paper are 5375 by 4000. There is no provision for automatic scaling, so all scaling must be done in user programs. Within this grid, the pen may be moved to an absolute location (PA) or moved relative to its previous position (PR).

Upon startup, the plotter is automatically initialized; however, this command can be given through software as well. The Home Pen command moves the pen to the home position, a good practice at the end of a plot. For positioning a plot on a sheet of paper, the origin can be defined at any point with the DO (Define Origin) command.

The plotter has four alphabetic character sets for various foreign languages. Each set has 96 plotting characters. In addition, there are nine symbols

LMNOPQRSTUVWXYZabcdefg
ABCDEFGHIJK

Figure 1.
Portion of
alphabet in
character size 10.



THE PERSONAL PRINTER BUILT LIKE A SHERMAN TANK PERFORMS LIKE A CONCERT GRAND.

Why We Get Encores. Okidata takes center stage with a cast of printers that can't be outperformed. All eight dot matrix printers offer you more features for your money than you can find anywhere else. Pick your tempo: data processing at speeds from 80 to an exceptional 350 cps; to stress a point, enhanced and emphasized printing at up to 100 cps; outstanding letter quality printing at speeds three times faster than most daisywheels — up to 85 cps. Add a full range of graphics capabilities, down-line loadable character sets for creating personalized typefaces and symbols, and your print repertoire is virtually unlimited.

We Play On and On. Our virtuosos feature rugged steel frames, laser-

welded parts, and our long-life, non-ballistic print head warranted for up to one full year. With this tank-toughness you'd expect Okidata to have the lowest warranty claim rate in the industry. And we do: less than 1/2%.

In Tune with All Major Computers. We've designed each of these finely tuned instruments to be harmonious with all the major names in personal computers. And to give you more than you'd get from the major computer name printers. After all, we specialize in printers. The computer folks specialize in computers. (That's why MOST buy their printers from somebody else).

Larger Selection. Smaller Prices. Because we make more printers than anybody else, we can give you just the

right one to fit your specific needs. Not to mention your budget. Suggested retail prices range from \$299 to \$2995. Call 1-800-OKIDATA (in NJ, 609-235-2600) for the dealer nearest you. Both you and your computer will enjoy the performance.



OKIDATA

Mt. Laurel, NJ 08054

A subsidiary of Oki Electric Industry Company Ltd.

CIRCLE 180 ON READER SERVICE CARD

Print About Printers, continued...

(diamond, triangle, x in square, etc.) that can be used on line graphs (or anywhere you wish).

The basic character size is 0.016" high by 0.008" wide (mighty small!), but characters are generally drawn as multiples of this basic size. The default multiple is 8, which is slightly larger than standard 10-pitch pica type. A multiple of about 600 will produce a character that fills an entire page. We found the characters were very legible from size 3 on up.

Characters can be drawn in any of four directions. Figure 1 shows the upper case alphabet in two directions in character size 10.

Making Plots

Once we got the hang of it, the Strobe was easy to use. A nice feature with the Apple version is the included Apple Starter disk which contains six sample plots and charting routines. The plotter has a self-test (hold down Start/Enter upon power up) not mentioned in the manual, and the plots on the Apple disk are a good test, too—perhaps too good.

On multiple color plotters, a frequent problem is pen alignment. The Strobe is no exception. Figure 2 shows five short line segments drawn with five different pens. Yes, they are within the specified 0.002", but just barely. We would not call this a straight line.

Figure 3 uses four colors and is very effective on a bar chart of this kind. Since the chart communicates its message, it is less evident that the bars actually go below the bottom x axis or that the top portions of the bars are slightly out of alignment with the bottom portions. Indeed, multiple colors on an in-



Figure 2. Segments of a straight line drawn with five different colored pens.

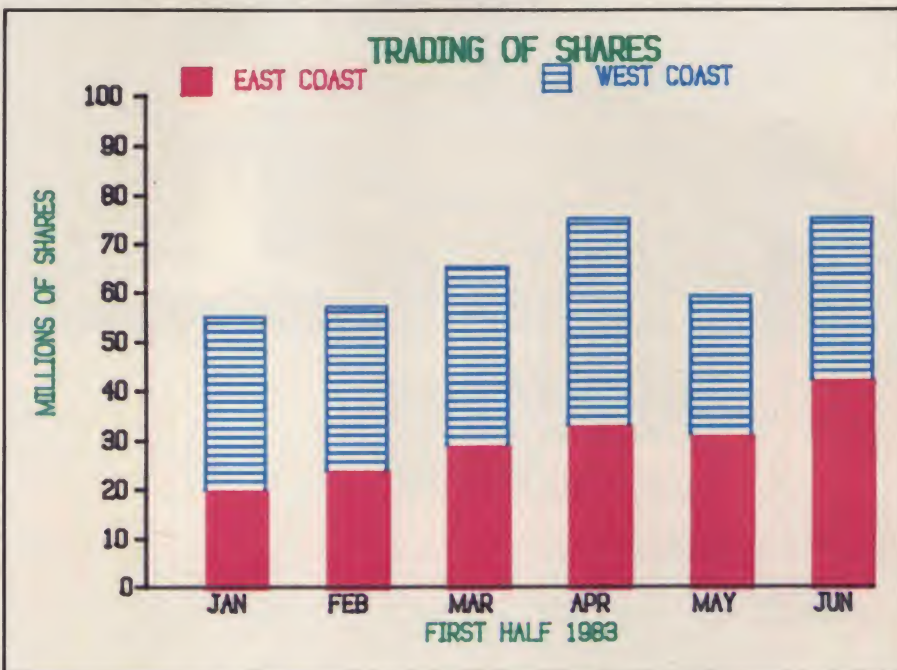


Figure 3. Bar chart drawn with four colored pens. Notice the misalignment of the bars with the x axis and the upper and lower portion of the bars.

expensive plotter have a cost in precision.

The plotter uses a system of precisely notched rubber belts, plastic gears, and servo motors to position the drum, pen head, and pen turret (change colors). If the plotter is attempting to execute several commands in rapid succession, it

occasionally does not rotate the pen turret to a full stop. Figures 4a and 4b show the same pie chart, but in 4b, the pen turret did not rotate fully to the black pen, so two pens actually made contact with the paper producing an interesting, but unwanted effect.

Basically, we feel that multiple colors

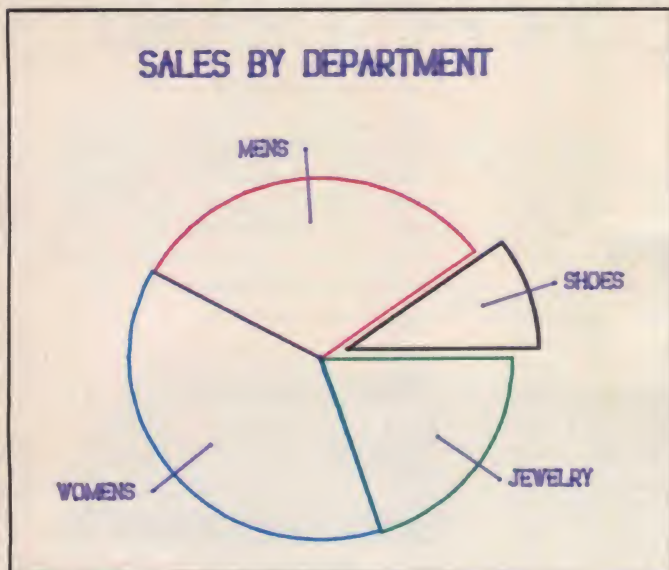


Figure 4a. Pie chart drawn correctly.

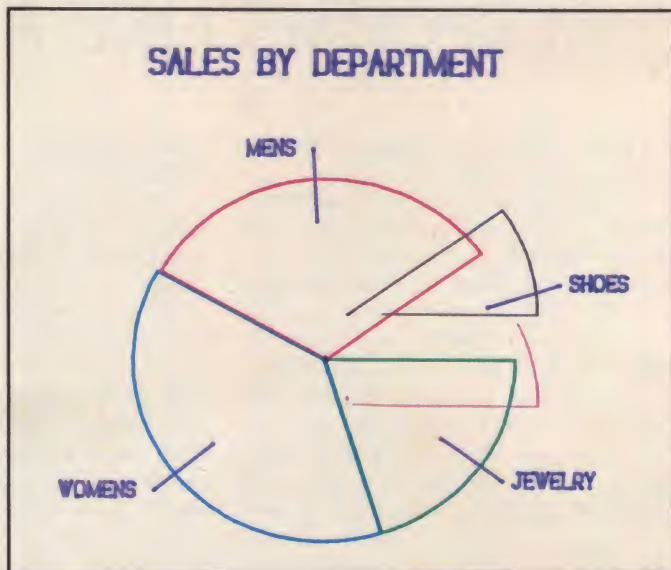


Figure 4b. Same pie chart as in Figure 4A. Black pen did not rotate completely into position.

THE BUFFER DID IT.

Who Stole The 1500 Letters From The Computer?

Let's just say you've got to send a letter to 1500 different people. Would you like to spend 22.5 hours* or 60 seconds of computer time?

With a garden-variety buffer, the computer has to mix, merge and send 1500 addresses and 1500 letters to the buffer. Trouble is, most buffers only store about 32 letters. So after 32 letters, the computer's down until the printer's done. Altogether, you're talking 22.5 hours.

In the case of our new (not to mention amazing) ShuffleBuffer, computer time is 60 seconds flat. Just give

ShuffleBuffer one form letter and your address list, and it takes care of the mixing, the merging, and the printing. But that's not all ShuffleBuffer's stolen from the computer. Oh, no.

Who Changed and Rearranged The Facts?

Again, ShuffleBuffer's the culprit. You want to move paragraph #1 down where #3 is? Want to add a chart or picture? No problem. No mystery, either. Any buffer can give you FIFO, basic first-in, first-out printing. And some

buffers offer By-Pass; the ability to interrupt long jobs for short ones. But only ShuffleBuffer has what we call Random Access Printing — the brains to move stored information around on its way to the printer. Something only a computer could do before. Comes in especially handy if you do lots of printing. Or lengthy manuscripts. Or voluminous green and white spread sheets. And by the way, ShuffleBuffer does store up to 128K of information and gives you a By-Pass mode, too.

And Who Spilled The Beans 239 Times?

Most buffers can't tell the printer to duplicate. If they can, they only offer a start/stop switch, which means you're the one who has to count to 239. Turn your back on your buffer, and your printer might shoot out a room full of copies. ShuffleBuffer, however, *does* control quantity. Tell it the amount, and it counts the copies. By itself.

So, What's The Catch?

There isn't any. Sleuth around. You won't find another buffer that's as slick a character as this one.

You also won't find one that's friendly with any parallel or serial computer/printer combination. This is the world's only universal buffer.

With a brain.

Who Wants You To Catch A ShuffleBuffer In Action?

You guessed it. We do. Just go to your local computer dealer and ask him to show you a ShuffleBuffer at work. Or, you can call us at (215) 667-1713, and we'll clue you in on all the facts directly.

* Based on an average 4000 character letter & 128K buffer.



Now, keep th
my doughboy
Love,
Gladys

Mr. Harold Burns
P.O. Box 1111
Toledo, Ohio 18420

Dear Harold:

You'd be amazed at me. I love to

Just imagine. He, an entrepreneur. And all that time, Harold, my dear

my dear. That's a lot of letters, my dear. And all that time, Harold, my dear

here, see for yourself how pretty my profit is.

It's not so much the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

It's a real secret to the (computer like the marvelous)

ShuffleBuffer
The Buffer with a Brain

Interactive Structures Inc.
146 Montgomery Avenue
Bala Cynwyd, PA 19004

CIRCLE 202 ON READER SERVICE CARD

Print About Printers, continued...

are very nice, but are best used in places where precise matching of lines and boundaries is not critical. For example, the line graph in Figure 5 uses color effectively, and mismatches are not evident.

As A Digitizer

In digitizer mode, you fasten the diagram or chart you want to measure to the drum and give the plotter the DP digitizing command. In this mode, the pen is used as a cursor and may be moved with the four directional buttons to any point on the plotting area. When the Enter button is pressed, the current coordinates are saved and can be accessed by the computer with the OD (Output Digitized Point) instruction. The coordinates are given in absolute plot units (0.002").

The manual describes how to use the digitizer mode in conjunction with the plotting mode, and presumably this would be valuable for some engineering applications. Frankly, we are not familiar enough with these applications to give them a real workout. We tried the digitizer mode and it worked, although it is very difficult to position the pen accurately when it is in the up position. (This is true with any plotter, not just the Strobe.)

Documentation

The user's manual has three sections: a 16-page introductory section with specifications and set up instructions, a 16-page section describing the starter disk, and a 64-page section describing communications and the graphics commands.

The introductory, starter disk, and communications sections are excellent. Indeed, as we mentioned earlier, the section on communications is the best we have ever seen.

The section on the graphics commands is adequate in its description of the instructions but totally devoid of examples. This we regard as a major flaw. We think a plotter manual should have examples of its commands for several computers and should have portions of plots to show what these commands actually do.

The Last Line

The generalized routines on the Apple Starter Disk (available for the IBM PC and CP/M machines as well) are excellent for producing bar, pie, and line graphs. However, if you want to go beyond that, you must commit yourself to spending some hours of experimentation determining how the commands work with your computer, and how to produce the plots you want.

Although the various colors do not

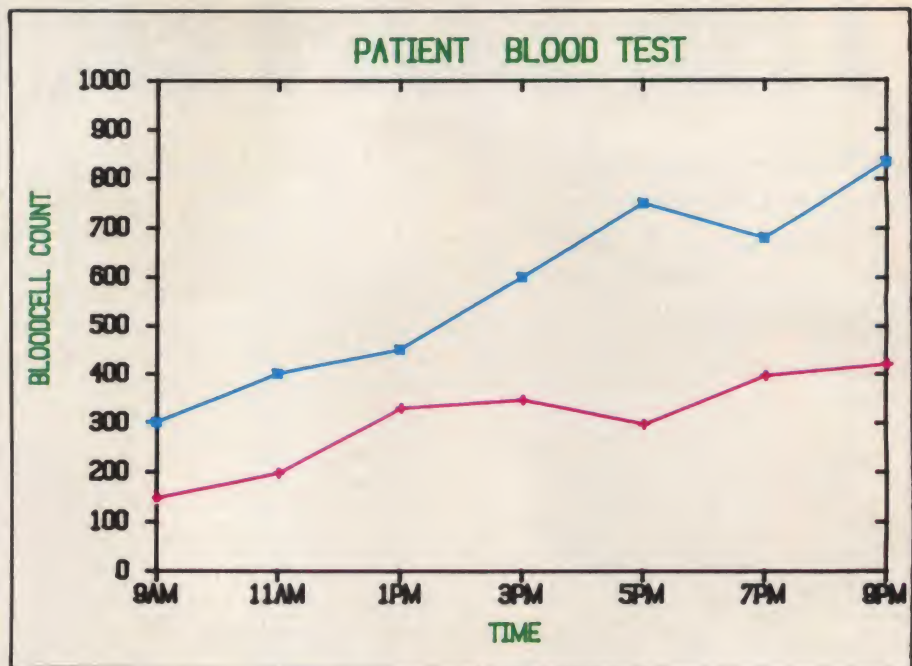


Figure 5. Line chart uses color effectively.

line up precisely, we feel that they can be used to produce acceptable and very effective charts for business and personal use. For architectural and engineering drawings and precise mathematical plots, we feel it is best to stick to one color.

For under \$1000, the Strobe Model 260 eight-color plotter (\$995) and the even less expensive (\$695) Model 200 one-color unit offer good value for producing letter-size plots. The included software disk is a nice extra, and it is reassuring to know that Strobe maintains a responsive customer service department too.

For more information, contact Strobe Inc., 897-5A Independence Ave., Mountain View, CA 94043. (415) 969-5130.

Laser PP40 Printer/Plotter

The Laser PP40 is an inexpensive (\$199) four-color printer/plotter from Video Technology. It has a Centronics parallel interface so it is suitable for use with a wide range of computers, not just the machines from Video Technology. It uses 4 1/2" wide roll paper, so it is not suitable for business correspondence; however, for low-cost plotting it is an excellent unit.

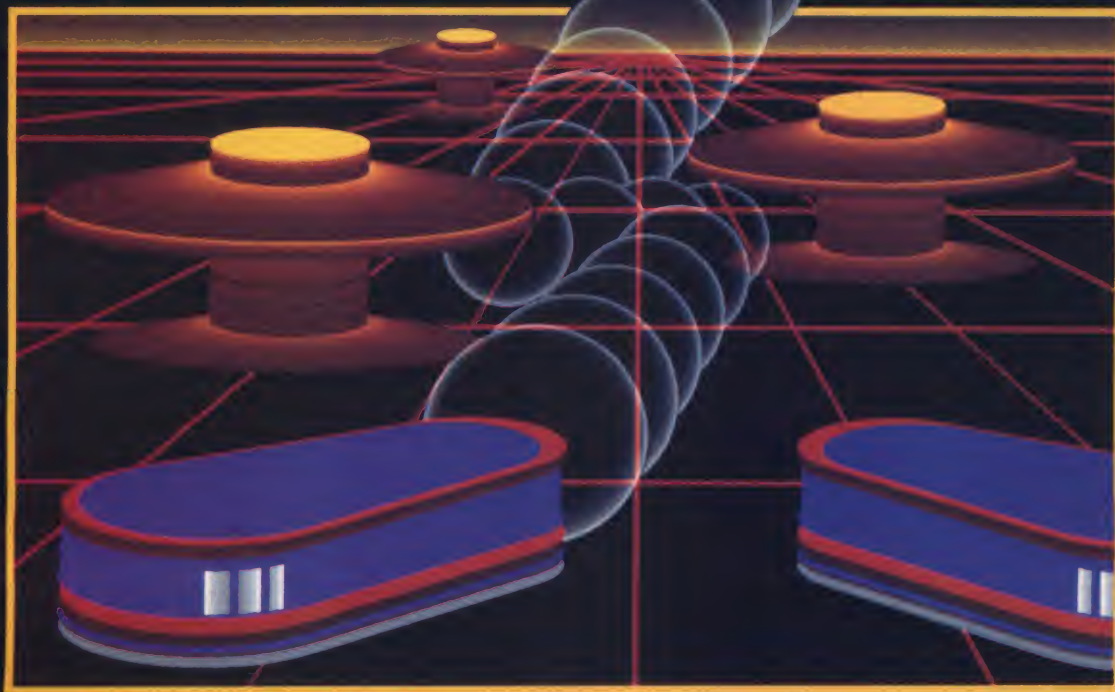
The PP40 is one of the smallest printer/plotters we have seen, measuring a diminutive 9.5" x 4.5" x 2.1". An external 8-volt, 1500 ma power supply is also furnished. On the outside of the case we find a rocker off/on switch, red



The Laser PP40 four-color printer/plotter.

TAKE A BREAK!

For Apple,
Atari, Commodore 64,
and IBM-PC



WITH NIGHT MISSION **PINBALL**

You deserve the best. You've earned it. Now reward yourself with a session of **Night Mission PINBALL**, the most realistic and challenging arcade simulation ever conceived! ■ Stunning graphics and dazzling sound effects put **Night Mission PINBALL** in a class by itself. Game features: multi-ball and multi-player capabilities, ten different professionally designed levels of play, and an editor that lets you create *your own* custom modes. ■ So take a break with **Night Mission PINBALL** from SubLOGIC. Winner of *Electronic Games* magazine's 1983 Arcade Award for Best Computer Audio/Visual Effects.



See your dealer . . .

or write or call for more information. For direct orders please add \$1.50 for shipping and specify UPS or first class mail delivery. Illinois residents add 5% sales tax. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800/637-4983

CIRCLE 257 ON READER SERVICE CARD

subLOGIC
Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995


```

0 " # $ % & ' ( ) * + , - . /
0 1 2 3 4 5 6 7 8 9 : ; < = > ?
@ A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z [ \ ] ^ _
` a b c d e f g h i j k l m n o
p q r s t u v w x y z { | } ~ ¤
    
```

Figure 6. Character set of Laser PP40 in size 1.

LED power indicator, and three press switches for paper feed, pen change, and color change. On the back are connectors for the power input and Centronics-type interface cable.

To connect the PP40, you will need a cable from your computer with a Centronics-type connector. Some computers such as the Laser 200, Vic-20, TI 99/4A, and Timex/Sinclair 1000 require a separate interface, while on higher-end units this interface is built in.

Paper loading is very simple, as are pen mounting and pen changing. The PP40 comes with one roll of paper and four pens with fine ball tips (black, red, green, and blue). Additional paper rolls are available from office supply dealers, while replacement pens must be purchased directly from V-Tech. Although it is not mentioned in the manual, we suggest removing the pens from the unit and replacing their covers if you plan to let the PP40 stand idle for more than a day or so.

Figure 7. Character set in size 2 and program used to produce it.

```

0 " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9
: ; < = > ? @ A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m
n o p q r s t u v w x y z { | } ~ ¤
    
```

```

10 LPRINT "Character Set"
20 LPRINT CHR$(18); "S2": LPRINT CHR$(17)
30 FOR I=32 TO 127
40 LPRINT CHR$(I);
50 NEXT
60 LPRINT: LPRINT CHR$(18); "S1,C0,A"
    
```

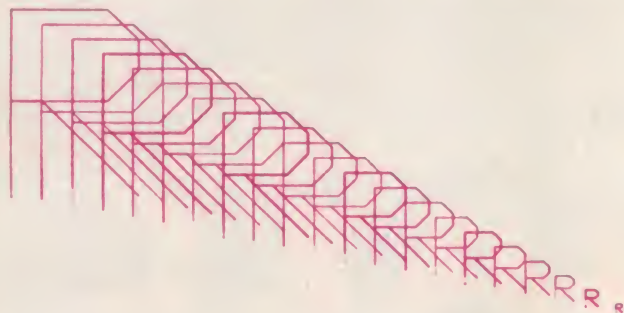
On the bottom of the unit is a small plate that covers a DIP switch. One switch selects whether carriage return implies line feed or not, and the other selects 40- or 80-column printing (spelled on the box, "coloum"). Forty-column printing produces 11 characters per inch and 5.5 lines per inch. Eighty-column printing uses a much smaller character size, and produces twice the vertical and horizontal density (22 cpi and 11 lpi). See Figure 9. Using this character size (0), the print speed is 10 cps; the larger the character, the slower the print speed.

The PP40 has a character set of 95 ASCII characters (see Figure 6). In the

40-column printing mode, characters are produced in size 1. In the graphics mode, the PP40 can produce 64 character sizes; the second size is shown in Figure 7, and sizes 0 to 20 are shown in Figure 8. Size 63 is very large indeed with each letter measuring 2" x 3".

Graphics Mode

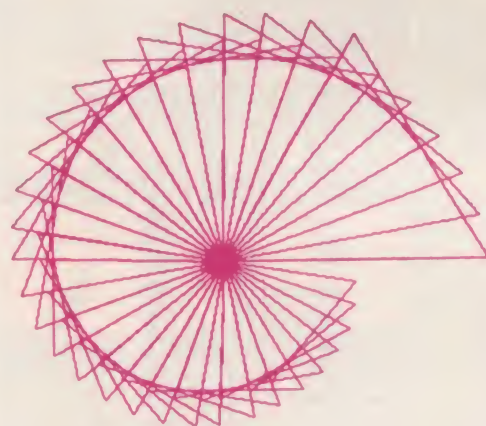
In the graphics mode, the PP40 can produce plots 96mm (3.7") wide in the x direction by 6.55 meters (over 21 feet!) long in the y direction. The x direction is divided into 480 steps each 0.2mm in size; the y direction can have up to 32,768 steps. In reality, however, you



```

10 LPRINT "Different Character Sizes"
20 LPRINT CHR$(18); "R0,-200"
30 LPRINT "I"
40 FOR I=0 TO 20: LPRINT "HR20,-3"
50 LPRINT "IC"; I; ",S"; 20-I; ",PR"
60 NEXT
70 LPRINT: LPRINT "S1,C0,M0,-20": LPRINT "A"
"
70 LPRINT: LPRINT "S1,C0,M0,-20": LPRINT "A"
    
```

Figure 8. The letter R in the first 21 out of 64 character sizes, and the program to produce the plot.



```

10 LPRINT "Spiral Pattern": PI=3.14159
20 LPRINT CHR$(18); "M220,-200": LPRINT "I"
30 D=-10: R=100: F=PI/3: LPRINT "C3"
40 FOR J=1 TO 30
50 D=D+10
60 R=R-3: K=D*PI/100: Y1=R*SIN(K): X1=R*COS(K)
70 Y2=R*SIN(K+F): X2=R*COS(K+F)
80 LPRINT "D"; X1; ",X1"; Y1; ",Y1"; X2; ",X2"; ",.8,B"
90 NEXT J
100 LPRINT "HR-300,-150": LPRINT "C0,A"
    
```

Figure 9. A spiral of triangles of decreasing size. The program listing was produced in 80-character text mode with character size 0.

will probably use only a fraction of the y direction potential. Resolution with any color pen is 0.2mm, and drawing speed is 52mm per second.

The graphics commands recognized by the PP40 are nearly as rich and varied as those on much larger and more expensive plotters. The PP40 can produce 15 different types of dotted lines, as well as a solid line. It can also produce coordinate axes automatically.

The draw command (D) draws a line between any number of x,y point pairs, while relative draw (J) draws a line from the present location to an x,y point pair. Move and relative move function similarly, but with the pen up.

The color command (C) selects a pen color, scale set selects one of 64 character sizes, and alpha rotate selects one of four directions for the printing of alphanumeric characters.

The CC40 has three initialization commands: A initializes everything and puts the plotter in text mode; I causes the present pen position to be taken as the starting point; and H moves the pen to the home position with the pen up.

The only bone we have to pick is that the plotter requires that commands and separators (commas) be sent to the plotter enclosed in quotation marks in an LPRINT statement. Most other modern plotters do not require quotes. For example, a draw command between three point pairs must be sent to the PP40 as:

```
80 LPRINT "D"; X1;"",Y1;"", " ";
X2;"", "Y2;"",0,0"
```

On other plotters, this line would read:

```
80 LPRINT "D" X1,Y1 X2,Y2 0,0
```

As might be expected, the PP40 does not draw true diagonal lines. Instead, these lines are produced as a series of horizontal or vertical straight lines with small steps to create the diagonal direction. These steps are evident in the spiral plot shown in Figure 9.

Documentation

The user manual for the PP40 is better than many of the manuals that come with many other Hong Kong products, but it is still nothing to brag about. All the graphics commands are described in a condensed half-page table. Fortunately, the second half of the 38-page manual is devoted to six example plots. Program listings are provided for three computers: Laser/V-Tech 200 (standard Microsoft Basic), Apple II (Applesoft Basic), and Dragon 32 (same as Radio Shack Color Computer). By studying these programs, you should be able to

determine how each text and graphics command functions.

The Bottom Line

Frankly, we like the PP40. It is not a professional, full-function plotter, nor does it take the place of a full-size printer. However, as an inexpensive output device that can do both printing and plotting, it does an admirable job.

The graphics command structure is

somewhat cumbersome; diagonal lines are not truly straight; and the documentation could be improved upon. Nevertheless, these are small inconveniences against the good performance, compact size, and low (\$199) cost of the PP40.

For more information, contact Video Technology, 2633 Greenleaf Ave., Elk Grove Village, IL 60007. (312) 640-1776.

END

IF YOU'D RATHER BE SAILING, TRY SAMS BERMUDA RACE.

Now you can sail all-year round, without ever leaving the comforts of your home with Sams BERMUDA RACE—the new sailing software program for your Apple® computer. ■ BERMUDA RACE is the ultimate test for any sailing enthusiast, novice or expert. So whether you race alone or against a competitor, you may be surprised to find out how good a sailor you really are.

Or aren't. ■ Either way, you're sure to enjoy the challenge and excitement of Sams BERMUDA RACE. To order or to get the name of your local software dealer, call 800-428-3696 or 317-298-5566. And ask for Operator 440.

Offer good in USA only
and expires 3/31/84
Prices subject to
change without notice.
In Canada, contact
Lenbrook Electronics,
Markham, Ontario
L3R 1H2.

SAMS BOOKS AND SOFTWARE
HOWARD W. SAMS & CO., INC. • 4300 West 62nd Street • P.O. Box 7092 • Indianapolis, IN 46206



Computing For The Handicapped

"Welcome to the world of VIM, your third hand." That is how the VIM (Voice Input Module) introduces itself when booted up on the Apple IIe. This was the beginning of a demonstration I was given at the offices of Voice Machine Communications, Inc. in Santa Ana, CA.

Arnold Balliet, one of the members of the design team for the VIM put the product through its paces. Conclusion: this could be the beginning of another revolution, perhaps as big as microcomputers themselves.

The VIM is an exciting product because it represents the leading edge of technology. Don't misunderstand, the VIM works fine today and performs well enough to make life easier for many people. The technology is still embryonic, and it is the future of VIM and other voice recognition systems that is exhilarating. The way things are going, when new and improved are the norm, yesterday's product is on a par with the Model T, and day before yesterday's is antediluvian, that ultimate system is probably not too far off.

We are rapidly approaching a time when entire households will be operated by voice alone. That means the old standby, our favorite hackneyed phrase, user-friendly, will truly be that. Which leads us to conclude that the next step will not be far behind: your computer will talk back to you. Shades of HAL from 2001—hopefully with a more benevolent attitude.

Enough crystal ball gazing, let me tell you about VIM as it exists today. Voice Machine Communications may have an edge on its competitors. The president of the company, Ron Runge, was the developer of the chip for the voice recognition

Shel Talmy

system and, along with his design team, is continuing to improve it. The latest version is the SS-VIM which has doubled the memory size of the previous model. This allows space for 172 words to be programmed into the device at any one time. This amount of vocabulary is more than enough to run any existing program by voice and still have plenty of room left over. Since you can create as many vocabulary programs as you like there is no limit to the number of functions that VIM can perform.



The VIM (Voice Input Module).

VIM comes with several pre-programmed vocabularies for such standard programs as *WordStar*, *VisiCalc*, and Apple Basic, plus Black Jack and a maze game. The beauty of this is that the computer novice literally can sit down and start running application programs at once. There is no need to memorize dozens of control characters, or puzzle out an English translation of the manual. With *VisiCalc*, for example, you can move the cursor by voice to any column, make entries, split the screen, scroll up and down, and do any other spreadsheet functions.

Getting Started

The VIM is connected in parallel with the keyboard, which is handy because you can use a combination of speech and keystrokes whenever it suits you. The first thing you want to run is the Apple Voice Input Module program (AVIM) which presents you with a menu that includes options to build a new vocabulary, train an existing one, or test for recognition. The "train" option, for example, loads an existing vocabulary to the VIM board.

You are then asked to repeat the words into the microphone so that the VIM will recognize your voice. The wave forms are stored on disk for retrieval. You are asked to repeat each word three times and usually this is enough for the VIM to acknowledge your speech pattern. If not, the clever little devil will ask you to repeat the words until it is satisfied. I had to repeat a couple of the words about ten times, giving credence to my mother's complaint that I mumble.

The VIM will also examine words that might sound alike, such as *bad* and *dad*, give you a numerical recognition factor between the two words it has compared and then ask for further training if the

Shel Talmy, 11468 Dona Teresa Dr., Studio City, CA 91604.

ARCADE CLASSICS. A BLAST-FROM-THE-PAST.



Remember those great arcade games of the past?

Games like Bally Midway's™ *Seawolf II*™. As sub commander, you torpedo enemy ships moving at different speeds. Sink as many as you can, but watch out for the mine fields.

And Bally Midway's *Gun Fight*™. In the most famous shootout of all time, you'd better be a straight shooter and fast on the draw.

Exidy's™ *Starfire*™ gives you outerspace graphics that are out of this world. Plus a starship with laser cannons to help you rid yourself of alien forces.

And there's Exidy's *Fire One*™. Hone in on the enemy with sonar. Then it's up periscope and torpedoes away.

EPYX has brought the arcade classics home—at the right price for you. We've combined the Bally Midway classics *Seawolf II* and *Gun Fight* on one disk and Exidy's classics *Starfire* and *Fire One* on another. So get the arcade classics today and have a blast-from-the-past on us.

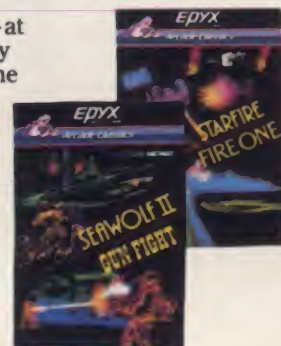
One or two players; joystick controlled; arcade style graphics and sound.



EPYX
COMPUTER SOFTWARE

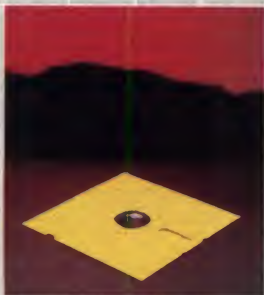
Strategy Games for the Action-Game Player

CIRCLE 153 ON READER SERVICE CARD



***a.d. 2082.
Diskettes
duplicated
by Allenbach
in 1983
will still be
guaranteed.***

This Lifetime Guarantee, exclusive to Allenbach, adds quality and consumer confidence to your software products. While this alone is reason enough to let Allenbach handle your software duplication, most software developers initially choose us for convenience. We can probably complete your production faster than you can. Additionally, your whole project can become one-easy-step by having us perform all packaging requirements from printing to assembly.



You'll also appreciate the high standard of excellence demanded by Allenbach. Software duplication for practically any format is our primary business. We've established a team of professional technicians who specialize in all phases of software duplication. Your software is effectively reproduced on specially designed precision duplicating equipment. Also used are exacting verification methods unique in the industry to guarantee 100% accuracy. Plus your software will be duplicated onto the Allenbach diskette, the OEM diskette that is Guaranteed for Life.



Allenbach *really* is the logical solution for your software duplicating needs. So feel free to call us with your questions. Take advantage of our years of experience and knowledge. Have Allenbach do what we do best, so you can do what you do best.

2101 Las Palmas
Carlsbad, California 92008
619-438-2258
800-854-1515 (Toll Free)
Telex: 19-4561 LSA

words sound too similar. (VMC claims a 98% plus recognition success rate.) When this is completed and both you and the VIM are satisfied with each other, you are ready to run programs by the sound of your voice. This training procedure takes just a few minutes.

Let's examine some of the applications. Imagine a high volume billing operation or an auto accessory company with thousands of parts in its catalogue. The operator has his or her hands free to find the items wanted while making the requisite entries by voice. It would be difficult to put a percentage on it, but the efficiency quotient would have to be substantially improved.

And what does all this have to do with the handicapped user? Read on.

CASH

Cash is a word that we all know and love; the dictionary defines it as "money that a person has, especially ready money." In this case CASH is an acronym for Computer Aided System for the Handicapped. The acronym is intentional. The system is the means by which the handicapped user can go back to work and do almost anything that can be accomplished by the average user.

The CASH board has some special functions for the physically disabled. One is the ability to reset the computer vocally instead of with two keystrokes which are beyond the capability of some severely handicapped people. The other is the capacity to make a good job of running the entire household by voice.

The Apple requires a 64K extension card. This is where the "home controls" reside. It works this way. Let's suppose you are using *WordStar* with the VIM to compose a document and the phone rings. You speak the word *interrupt*, which shifts control to your "other functions" area, where you can answer the phone with a spoken command. Don't worry about your document, *WordStar* will be ready to pick up where you left off when you have finished with the call.

Let's say that during the conversation, you decide that the temperature in the room is too low and you want to boost it a couple of notches. Just excuse yourself for a moment and give the appropriate command.

The VIM interfaces with the standard BSR module and other similar units. You can turn lights and tape recorders on and off, dial a telephone, raise or lower a bed, and just about anything else that can be accomplished through the magic of electricity. Also, any standard voice synthesizer can be connected to the system for use by a visually impaired operator.

At this writing, the system is going through its final testing and should be on the market by the time you read this.

Certainly, this is a great step forward for the handicapped. It provides a measure of freedom and independence that was heretofore unavailable as a complete package.

Voice Design

One other function of the VIM that I haven't yet covered is its use with graphics. Drawing by voice was a real revelation, especially for me who has trouble managing a straight line with a ruler. The program I used was *Delta Drawing* from Spinnaker, and it was simplicity itself using vocal commands to draw sets of triangles and fill them with color at a word.

VMC's parent company is KTI Cascade, who among other things sell a line of CAD/CAM software (computer aided design and manufacture). With the VIM added to the system, I am told it is now a snap to accomplish many of the difficult functions required for technical design.

To sum it all up, VIM has solid applications, for the handicapped and commercial markets. The bad news is that the VIM will interface only with the Apple, and there are no plans to make it compatible with other systems. This is a regrettable state of affairs for the multitude of CP/M and IBM PC users. I, for example, would like to use the VIM with my Compu-

Pro, as I use word processing, spreadsheet and database programs. Alas, this is not to be, at least for the present.

The standard VIM with an 80-word vocabulary, microphone, and software costs \$920 for the Apple II Plus and \$995 for the Apple IIe.

There is no price as yet for the SS-VIM with its 172-word vocabulary. However, it is expected to be approximately 50% higher than the standard VIM. Voice Machine Communications, Inc. is located at 1000 South Grand Ave., Santa Ana, CA 92705. (714) 639-6150.

The CASH system comes with four boards. The Opto-Relay board is for hard-wired items such as a book page turner or the operation of a bed. It also includes a telephone dialer. There is a 16-channel I/O board, a controller for the BSR type module, and a real time clock. The system is expected to sell for approximately \$3200. The sole distributor for the CASH system is Freedom Design, Inc. located at 1884 Eastman Ave., Ventura, CA 93003. (805) 654-8221. END



ISOBAR... the most complete computer protection!

More features to prevent errors, false printout, disc skips! *Only ISOBAR has 3-way spike protection, noise suppression for RFI PLUS isolated filter banks!* Individual filter banks isolate each load from other loads minimizing data errors of any kind. MOV surge suppressors arrest both common mode and differential mode surges. L/C filter network rejects radio frequency noise at any amplitude. Torroidal coils for greatest efficiency! All-metal housing.

Indus-Tool, 325 W. Huron, Dept. CC
Chicago, IL 60610 • Call 1-312-642-6871
 Enclosed is \$ _____ or charge on _____
☐ MasterCard or ☐ Visa Expires _____
 Card no. _____
 Name _____
 Signature _____
 Company _____
 Address _____
 City _____ State _____ Zip _____

Model IBAR 4-6
(4 outlets,
6 ft. cord)
Only \$79.95

Model IBAR 3-6
(3 outlets,
6 ft. cord)
Only \$54.95

Model IBAR 8-15
(8 outlets,
15 ft. cord)
Only \$97.95

CIRCLE 204 ON READER SERVICE CARD



Telecommunications Talk

This profile of Delphi is the first segment in what will be a continuing feature of the column, a review of the various information utilities currently available on a public or semi-public basis.

An information utility is a system which uses a large mainframe computer and can be accessed for a fee, by home or business computer owners for information and services in categories such as entertainment, shopping, business assistance, electronic mail, and education.

One of the newest entrants into the field is Delphi, a product of the General Videotex Corporation of Cambridge, MA. It came on line on February 15, 1983, so it is just about a year old. It boasts a total of 917 subscribers who seem to agree on one major point: the atmosphere of Delphi is much nicer than other information utilities.

"Atmosphere" translates, as far as I can tell, to the feeling of friendliness and concern that you detect reading the help messages and prompts of an information utility. With some utilities you sometimes feel that you are talking to your bank or the Department of Defense, because the tone is so cold and authoritarian. This is most definitely not the case with Delphi.

Delphi bills itself as the user-friendly utility, a claim which is upheld on the very first access to the system and ever after. The prompts and messages are usually very friendly, even when it is an error message that you are reading. You get the feeling that what you are connected to is not an information utility but a friendly local bulletin board service that simply offers far more than any BBS you have ever encountered. The achievement of this warm, friendly atmosphere is something

Brian Murphy

other services would do well to note and emulate.

Signing onto Delphi begins with sending them \$49.95, a one time subscription fee. Some manufacturers of communications software and hardware include a free Delphi membership and a free first hour in the cost of their product. It was by purchasing the *ASCII Express* for review later in this column that I stumbled onto such an offer myself.

Once they have your money, Delphi

Signing onto Delphi begins with sending them \$49.95, a one time subscription fee.

respond with shipment of a system handbook in a ring binder and a sheet with instructions for signing on through the Telenet system. To sign on, your modem should be capable of full duplex operation (simultaneous two-way communication) and be set for 7-bit ASCII with one stop bit and no parity. Your communications software should help you to configure your modem this way, if those are not already the default parameters.

As you sign on for the first time your "Membername" is your password. On your first access of the system, you are treated to a very amusing guided tour of Delphi during which you learn the simple commands which allow you to control the

display on your screen and to navigate between points in the world of Delphi.

Control and navigation are accomplished with simple commands. For example, to stop sending text to your screen, you press CONTROL-S. To skip through the text at a speeded-up rate, you key in a CONTROL-O. CONTROL-Y moves you from the item on the menu item you are on back to the previous menu. The most important one is CONTROL-Z. If you are stuck in a program you don't want and want to get back to the previous menu, a CTRL-Z will do the trick for you. You can move back one menu with each CONTROL-Z until you get all the way back to the main menu. All you have to do is wait for a program prompt and then key in the code.

Once you have learned the rudiments of navigation, it is time to explore Delphi in depth.

The various services of Delphi are accessed from a main program menu which lists the categories in Figure 1.

Figure 1.

APPOINTMENTS-CALENDAR
BULLETIN BOARDS
CONFERENCE
DELPHI-ORACLE
EXIT
FINANCIAL SERVICES
GAMES
GUIDED TOUR
HELP
INFOMANIA
LIBRARY
MAIL
NEWS
ON LINE MARKETS
PROFILE
TRAVEL
WRITERS' CORNER

Brian Murphy, 133 Post Rd., Fairfield, CT 06430.

SOFTWARE ARTISTS?

TO MAKE THE FIRST BASKETBALL PROGRAM that feels like the real thing, it helps to start with two guys who know what the real thing feels like.

Enter Larry Bird and Julius Erving. Bird — the hustler, the strong man, deadly from outside. Erving — The Doctor, maybe the most explosive player in the history of the game.

We talked to them, photographed them in action, studied their moves and their stats and their styles. Then we set out to create on computer disc an event which may never happen in real life. We put the two of them together on a dream court of light, for an electronic afternoon of one-on-one.

It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

And it shows. This thing is absolutely uncanny. You actually take on all the skills and characteristics of Bird or The Doctor — their own particular moves, shooting abilities, even strength and speed.

You'll meet with fatigue factors, hot and cold streaks, turn-around jump shots, and 360-degree slam dunks. But there's some whimsy in here, too — a funny referee, a shattering backboard, even instant replay.

It's called *Julius Erving and Larry Bird Go One-on-One*. "You're Bird. Or you're The Doctor. And that's the last decision you'll have plenty of time to make.

How we got this year's hottest sports game out of two rather inexperienced designers.



Julius Erving and Larry Bird Go One-on-One is now available on diskette for Apple II, II+, and IIe computers. Apple is a registered trademark of Apple Computer. To find out more about Electronic Arts and its products, write us at 2755 Campus Drive, San Mateo, CA 94403 or call (415) 571-7171.



LIFESAVER FOR THE FLOUNDERING COMPUTER USER.

Frustrating isn't it? You've decided to computerize. And now you're face to face with a computer of unprecedented power and versatility, squatting there on your desk like the inscrutable Buddha. And you don't have a handle on it. Not a clue.

They said your business would benefit tremendously, and you can dimly perceive what they meant. Instant information. Instant alternatives. Fantastic vistas of electronic communication. Hundreds, no, thousands of possibilities. And not a clue.

You need an EDP Manager. An affordable EDP Manager that speaks your language. It's called FMS-80, and it will change the way you feel about computers forever.

You can use FMS-80 to handle information... any information... in any way you want. It will comb the files and pick out similar items, using any relation you name. It will automatically update and do math for you. It will print any kind of report you want. And its memory is virtually unlimited.

It's easy to use because it's easy to learn. It gives

you a menu to choose from and you tell it what to do in plain language. It has on-line help, and supports you all the way.

Computer professionals were quick to understand the power of such a versatile system. All over the world, multi-user vertical application packages are being developed, based on FMS-80. There's *FMS LifePak*, an insurance sales person's program developed in Australia. There's *FMS Vision*, a 17-module international accounting package developed in the United Kingdom that can support an entire multinational corporation's accounting program or a one-man office. There's *FMS EasyLink*, an electronic communication package that accesses Western Union's EasyLink service for worldwide Telex, TWX, Mailgram, Telegram, Cable and message service... right at your computer screen! There's *FMS Telex*, a program that turns your computer into a Telex machine. There's *FMS Graph*, a series of business graphic programs under development now. And that's just the beginning. Choose a vertical package, or choose FMS-80 and customize your own. Either way, get smart... get FMS. It's not a lot of money; it's a lot of help.

FMS-80™

The affordable Multi-User Relational Database Management System.



Sometimes the
best things in life
are the least expensive.

DJR Associates, Inc. □ 303 South Broadway, Tarrytown, NY 10591 □ (914) 631-6766 □ Telex 646792 DJR NTAR

Distributors: North East (212) 679-6180. (203) 431-4966. ■ Mid-West (313) 478-4400. ■ Mountain & Plains States (712) 255-4362. ■ South-West (214) 445-1312. ■ West (415) 965-8000. ■ Other Areas (914) 631-6766. ■ International Canada (416) 821-3311. ■ Great Britain 44 (962) 69344. 44 (274) 309386. 44 (278) 662611. ■ France 33 1 5548284. ■ Greece 30 1 958 9862. ■ Israel 972 03-28-875. ■ South Africa 27 11 377-423. ■ Australia 61 2 922-3977. ■ Singapore 65 748-2483. ■ Philippines 63 2 817-4315. ■ Hong Kong 852 3-857091. Priced slightly higher internationally.

If you have a DECmate II, DEC Rainbow, IBM PC or Victor 9000 microcomputer, call today. Available for use with CP/M, MP/M II, MmmOST, TurboDOS, CP/M-86 or MS-DOS operating systems. Visa and MasterCard honored.

CIRCLE 214 ON READER SERVICE CARD

Delphi is a completely menu-driven system. To access any of these basic service categories from the main menu, all you have to do is to type the first two or three letters of the service in which you are interested, and you are on your way. After a short pause, you will be seeing the menu for the category you picked. In this menu will be the various specific services and options from which you may choose.

Believe me, this is not very complicated. The menus and prompts make everything clear to you without recourse to the printed manual.

Delphi Services

Let's summarize what a few of the service categories have to offer.

Appointments-Calendar is designed for the frequent Delphi user. It will be most valuable to daily users of Delphi. The service allows you to input your appointments for any given date in your personal storage area of Delphi. On the date of an appointment, if you access appointments, you will see a list of the day's appointments. If it is after 2:00 p.m. your time, you will see remaining appointments for the day plus tomorrow's engagements.

Bulletin Boards is a subject I have to handle with care because Glenn McIntyre, general manager for product development, says that the entire system is going to be redone. By the time this issue of *Creative Computing* hits the stands, that reprogramming should be completed.

It should suffice to say that as of this writing, the Bulletin Board is very much like many smaller BBS systems one would run into around the country. There are categories of messages touching on a wide range of topics, and the BBS system is getting good use. The difference is that on the Delphi BBS, you are likely to be reaching a national audience.

Confrence is one of the most endearing services I have encountered in any information utility. A virtually unlimited number can join the conference at any given time. McIntyre says that the largest group in which he has personally participated was 14 strong. The program also allows the conferees to form separate groups.

For example, one group could be talking about politics while the other was discussing computers or the space program. Individuals can switch from group to group with perfect freedom. Even with only three or four, the on-screen conversation is lively, with the floor going to the fastest typist. The bottom line is that Confrence is stimulating, great fun and the most addictive aspect of Delphi I have encountered so far.

Financial Services offers a banking service. You keep a bank account with Delphi which will, on your instructions, pay your monthly bills. You instruct Delphi which

creditors and how much to pay, and Delphi sends out the checks and balances your account for you. This is an exciting feature which one hopes will develop to include other banking services, such as savings accounts, brokerage, sales of money market instruments, etc.

The other aspect of the Financial Services program is the Advice option. In this area you can see the weekly stock recommendations of an investment counselling service. The service tells you which stocks they recommend you buy and which to sell. What the service does not provide is the analysis behind the recommendations. You do have a chance to look at the weekly and yearly performance figures for the recommended stocks, however, a feature which can either give you confidence or terrify you, depending on how correct the previous recommendations have been. Accessing this feature, by the way, costs an additional \$.95 per use.

Games is generally not as exciting as the rest of the utility. The games offered are text only games, of course, and if you

The menus and prompts make everything clear.

have a copy of David Ahl's *Basic Computer Games* series of books you are not missing much. On this subject, McIntyre says that an exciting multi-participant adventure game is in the works and may even be on line as you scan these pages.

Infomania is the program which offers some of the most interesting activities and features. There is a selection of electronic newsletters available, including one called "Inside Delphi," which keeps you abreast of the latest developments of the utility. You can create your own newsletter, with clearance from the Infomania editor.

Another fascinating activity is the Collaborative Novels program. There can be as many as four under composition at any given time, and to participate, all you have to do is read everything that has been written in the novel of your choice up to that moment and then make your contribution.

The Delphi Poll is another Infomania option; it lets you create and conduct opinion surveys on any issue you please. Up to 100 polls may be conducted simultaneously. You can not only vote but also record your comments on the questions.

Less than a dozen polls were active when we looked in on it in September, and participation was very light.

Electronic Library

One of the most impressive achievements of Delphi is the Library system. The three major components are the Kussmaul Encyclopaedia, the Dialcom Library, and the Research Library.

The Kussmaul Encyclopaedia is, like any print encyclopaedia, a general research tool. The Delphi version contains more than 20,000 entries on a very wide range of topics.

I accessed the article on Napoleon Bonaparte, one of my particular heroes, and found that though the entry was not exceptionally long, it did touch on all the major achievements and accomplishments of his career. For additional detail, cross references to related topics in the encyclopaedia were included in the text. At the end of the article, there was a list of cross referenced articles on related information. By keying in the number of the desired article, you can go right to it.

The articles, though brief, are well written and enjoyable on an adult level. I also had the strong feeling as I leafed through it, that most children would find the service useful and interesting.

For people who need utility programs for scientific and business applications, the Dialcom Library (at an extra fee) allows you to use a large number of helpful routines. Falling into the four general categories of business, computing and editing, mathematics, and statistics, the programs perform an interesting variety of tasks. Among the familiar and arcane utilities are programs to balance checking accounts, compute the moment of inertia for beams, calculate the sum torque acting on a lever to compute the various quantities for a Markov chain, and compute the amortization of a mortgage. In all there are 121 of these programs as of the time I write.

The Research Library is a collection of over 200 databases covering an extremely extensive range of subject matter. To read the monographs, articles, and other data in this library you must sign up for the database separately, and you must be prepared to pay substantially higher fees than for normal Delphi time.

It would be impossible in this space to cover all the topic areas, but here are some of the subjects: agriculture, international market forecasts, biographies of scientists, water science and pollution management, aquaculture, an index of criminal justice periodicals, coffee agriculture, abstracts on the rubber industry, U.S. public school directory, abstracts on non-ferrous metallurgy, health planning, and private and government grant information.

The Mail program is, as you would expect, an electronic mail system (to sound like you know all about it, call it "E-

Discover the hidden power of your TS 1000 and ZX-81

**The 50 ready-to-run
programs in this book
will show you how!**

If you suspect you're not getting all you can from your Timex Sinclair 1000, here's a new book that will make sure you do.

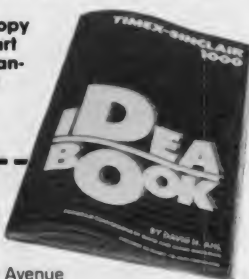
David H. Ahl has written 16 books about computers. In *The Timex Sinclair 1000 IdeaBook*, he puts 25 years of experience to work—to help you put your computer to work.

The *Timex Sinclair 1000 IdeaBook* includes 50 complete, pre-tested programs—each one designed to illustrate a specific problem-solving technique.

By working these programs on your own computer, you'll understand more fully its hidden strengths. Plus, you'll learn how to overcome its inherent weaknesses.

Armed with this knowledge, you're ready to put your Timex to work performing a multitude of practical, everyday tasks. Everything from balancing the family budget, to taking inventory, to performing science experiments.

**Order your copy
today—and start
taking full advantage
of your TS
1000.**



MAIL TODAY TO:
**CREATIVE
COMPUTING
PRESS**

Dept. MA3C
39 East Hanover Avenue
Morris Plains, NJ 07950

Please send me _____ copies of *The Timex Sinclair 1000 IdeaBook* for only \$8.95 each, plus \$2.00 shipping & handling per book, #3P

Total Amount \$_____.

☐ Payment Enclosed. (CA, NJ and NY State residents please add applicable sales tax.)

☐ Charge my: (Charge and phone orders: \$10 minimum)

☐ American Express ☐ MasterCard ☐ Visa

Card # _____ Exp. Date _____

Signature _____

NAME _____ (please print)

ADDRESS _____

CITY _____

STATE _____ ZIP _____

*Outside U.S., add \$3 for shipping and handling.

☐ Check here to receive a FREE catalog of computing books, magazines and guides.

**For faster service, PHONE TOLL FREE:
800-631-8112**

(In NJ only 201-540-0445)

Also available in your local bookstore and computer store.

Telecommunications, continued...

Mail"). Enough said, except to mention that after you have read your message, it disappears from the database forever.

Under the Online Markets heading there is a bazaar where you can sell that oscilloscope or the crock pot you have been trying to unload. At present it is more like a classified ads section than anything else. Delphi has grander aspirations for it, as a place where companies, public au-

originality, however, and it succeeds in making the user feel right at home. There is nothing forbidding about Delphi; it invites use and reuse.

There is a wonderful potential here, a potential that I think will be fulfilled.

BBS Numbers

Figure 2 is an intermittent feature of this column, a listing of bulletin board system numbers. I do not—and this magazine does not—vouch for the accuracy of each number. Anyone can commit a typo, after all. We also do not guarantee that all of them are still operating. To have your BBS number published, send it to me c/o *Creative Computing*. I will check it out to see if it is for real before I write it up.

If the service has an asterisk after, it is a 24-hour number. This month's listings are of IBM bulletin boards. It is not a comprehensive list, but it should be enough to get you started. 87

In Writer's Corner, you can store and retrieve text files of almost any length.

thorities and municipalities can do business requesting quotes and estimates, and advertise for bids.

In Writers' Corner, you can store and retrieve text files of almost any length that you have created on your home word processor. You can also use the edit functions of the Writers' Corner to create text files for use in keeping personal records to send to others via Delphi's electronic mail system and to publish in the Infomania section of Delphi. You even have the option of having your work set in camera-ready type. You may also use Writers' Corner to encode original programs in Basic, Cobol, Fortran, and Pascal.

Summary

It is obvious in strolling through the Delphi system how new a utility it is. The system has been put together with great

Figure 2.

Northeastern States and Canada

IBM Hostcom, Toronto, ON

(416) 499-7023*

IBM PC Computer Society, Boston, MA

(617) 353-9312

IBM PC, New York, NY (201) 678-6670*

Central Atlantic and Southern States

IBM Hostcom, Atlanta, GA

(404) 252-4146

IBM PC, Atlanta, GA

(404) 294-6879, 252-9438*

IBM Hostcom, Fairfax, VA (703) 978-9592*, 978-0921*, 591-5120*, 425-9452*

IBM Hostcom, Springfield, VA

(703) 425-7229*

IBM PC Annandale, VA (703) 560-0979*

IBM PC Dale City, VA (703) 680-5220*

IBM PC Vienna, VA (703) 560-7803*

IBM PC Charlotte, NC (704) 365-4311*

IBM PC Beltsville, MD (301) 937-4339*

IBM PC Bethesda, MD (301) 460-0538*

IBM PC Gaithersburg, MD

(301) 251-6293*

IBM PC Rockville, MD (301) 949-8848*

Central States and Deep South

IBM Hostcom, Houston, TX

(713) 980-0310*

IBM PC Niles, IL (312) 991-8887*

IBM PCMODEM, Chicago, IL

(312) 882-4227*, 376-7598*

IBM PC Madison, WI (608) 262-4939*

California and Far West

IBM PC California Users' Group

(805) 987-4127*

IBM PC, Culver City, CA (213) 649-1489*



Campbell

"You're not a daughter, you're a human modem."

PRO-MODEM 1200



It's about time.

Time for your computer to make the telephone connection – with an intelligent, full 212A 300/1200 baud modem – with a real time clock/calendar – and with the capability to expand into a complete telecommunications system. It's time for PRO-MODEM 1200. Much more than just a phone modem.

When you're on-line, time is money. PRO-MODEM telecommunication systems help you save. By monitoring the duration and cost of your phone calls. And by sending and receiving messages, unattended, at preset times when the rates are lower. . . with or without your computer.

Compare the \$495 PRO-MODEM 1200 with any other modem on the market. For example, you'd have to buy both the Hayes Smartmodem 1200 plus their Chronograph for about \$950 to get a modem with time base.

PRO-MODEM 1200 is easy to use. A convenient "Help" command displays the Menu of operating command choices for quick reference whenever there's a question about what to do next. Extensive internal and remote self-diagnostics assure that the system is operating properly. Some of the other standard features include Auto Answer, Touch Tone and Pulse Dialing, and Programmable Intelligent Dialing.

PRO-MODEM does more. It lets you build a full telecommunications system with features like Auto Dialer, Incoming and Outgoing Message Buffering, Business/Personal Phone Directory, Programmable Operating Instructions, a 12-Character Alpha-Numeric Time and Message Display, and versatile PRO-COM Software. PRO-MODEM commands are Hayes compatible so you can use most existing telecommunications software without modification.

There's much more to the PRO-MODEM story. See your local dealer for complete details. He'll show you how to save time. And money.

Prometheus Products, Inc., 45277 Fremont Blvd., Fremont CA 94538, (415) 490-2370



PROMETHEUS



Commodore's Port

Commodore's Port

How's it going, Commodorians? And where are all those wonderful manuscripts we've been asking for? Aren't you folks dying for fame and fortune? Don't you want to share your programming insights with *Creative Computing* and the rest of the avid Commodore community, whose breath is bated waiting for *your* application? Maybe it is a single neat POKE you have discovered, or a hi-res graphics game you have written. Get it down on paper, swabbie. Put it in an envelope and send it on through. It just may be a buried treasure.

Commodore Takes The Lead

Thought you might like to know this: Commodore microcomputers are now the number-one selling low-end machines around—by a substantial margin. With the C-64 nearing \$150 and disk drives at \$250 apiece, they offer the best buy around, and consumers know it. Watch out, Coleco. Remember that Adam was eventually driven from the Garden of Eden.

Commodore quality continues to improve, while its prices continue to drop. From our observation, the company no longer even sets list prices for its hardware and software. At the same time, the quality of Commodore hardware and especially of Commodore software seems to have made a quantum leap. My original reservations about the machine are gone. And just wait until you hear the latest.

Gadzooks, A Portable 64

Deep Boat, our main man from Commodore, stopped by the other day, and boy, did he have a show-and-tell for us: of both hardware and software. A crowd

John J. Anderson

of jaded doubters grew around his demonstration, but the tune soon changed. "Oohs" and "ahs" built to a crescendo, and then came the "wows."

At the 1983 winter and summer CES, we twice had the opportunity to view from afar a machine dubbed the Executive 64. We have enthusiastically reported on it more than once, but never truly believed in its existence; in the past Commodore has had an unfortunate habit of previewing hardware that somehow never made its way into the marketplace.

Well this one does exist. Deep Boat showed us a real, working Executive 64, and it swiftly took our breath, bated or not, totally away.

In a case substantially smaller than most other supposed "portables," the Executive 64 provides a full-blown C-64,

with detachable keyboard, half-height 5¼" disk drive, and 6" color and sound monitor. Expected price? "Somewhere around \$1000," says Deep Boat.

Physically, the unit is a beauty. Folded up and ready to go, it is no bigger than a portable VCR, and is much better-looking. The monitor, though small, provides a perfectly legible character set with a sharpness that is startling. To the right of the CRT and above the disk drive is a magnetically-isolated shelf on which disks can be stored.

But the real show-stopper on this machine is its keyboard. It is snow-white, with sharply-sculptured keytops as on the new IBM Selectric machines. The tactile response is quick and snappy. Our advice to Commodore: move this keyboard onto new regulation model C-64s as soon as possible.

The Executive 64 has all the features of its older brother, the C-64. It has a doored ROM cartridge slot in the top,



It looks like a portable VCR...



But unfolds into a full-fledged C-64.

 **commodore**  **64**

INDISPENSABLE SOFTWARE

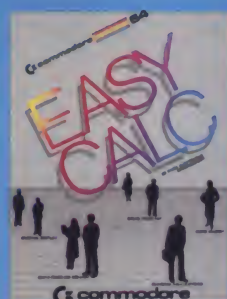
For Your Most Important Computing Needs



EasyScript 64
Displays 764 lines x 240 characters. Prints to 130 columns. Works with EasySpell 64.



EasySpell 64
20,000 word Master Dictionary and automatic spelling checker. Works with EasyScript 64.



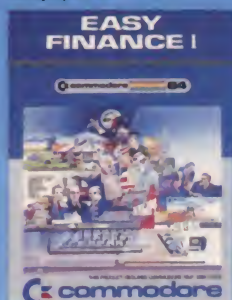
EasyCalc 64
Multiple electronic spreadsheet with color bar graph feature. 63 columns x 254 rows.



The Manager
Sophisticated database system with 4 built-in applications, or design your own. Text, formulas, graphics.



SuperExpander 64
21 special commands. Combine text with high resolution graphics. Music and game sounds.



Easy Finance I—Loan Analysis
12 loan functions. Bar graph forecasting as well as calculation.



Easy Finance II—Basic Investment Analysis
16 stock investment functions. Investment bar graph.



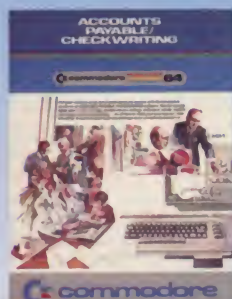
Easy Finance III—Advanced Investment Analysis
16 capital investment functions. Bar graphs.



Easy Finance IV—Business Management
21 business management features. Bar graphs.



Easy Finance V—Statistics and Forecasting
Assess present/future sales trends with 9 statistics and forecasting functions.



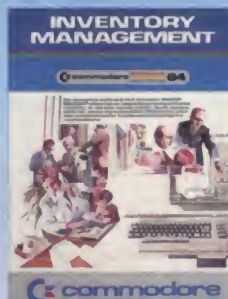
Accounts Payable/Checkwriting
11 functions. Automatic billing. 50 vendors/disk.



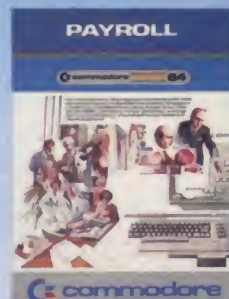
Accounts Receivable/Billing
11 billing functions. Printed statements.



General Ledger
8 general ledger options. Custom income statement, trial balances, reports.



Inventory Management
1000 inventory items. Full reports.



Payroll
24 different payroll functions. Integrated with G/L system.

 **commodore**
COMPUTERS

First In Quality Software

CIRCLE 106 ON READER SERVICE CARD

Commodore's Port, continued...



On top, a ROM cartridge slot.



The detached keyboard is superlative.



All the I/O of the C-64.

and on the rear of the unit appear the standard daisy-chain printer/disk drive jack, external monitor jack, serial edge-card connector, and dual joystick ports.

Commodore may make available a second half-height drive to fit the Executive 64 internally, in place of the storage shelf. Alternatively, access to a second drive may require external hook-up. Certainly the possibility of a second internal drive would propel the Executive 64 into the realm of the serious business portables in terms of capability. Professional word processing, spreadsheet, and database applications point to the need for a second 180K drive.

So if you are listening out there Commodore, be smart this time around. Get this machine out as soon as you possibly can. Don't dally about. Queasy about its marketability? For heaven's sake, why?

A substantial market for this machine will materialize as soon as the unit makes a real appearance. Especially if you were to *bundle* it with the types of software mentioned above. Throw in a built-in modem, your excellent *Magic Desk* software, and a mouse controller, and do to the low-end business market what you have already done to the home market. Namely, blow it wide open.

Best Soccer In The Cosmos

That wasn't all Deep Boat had to show us. *International Soccer* is a game cartridge that should be making its way into stores by the time you read this. It is, in short, the best sports game simulation we have ever seen for a computer.

Play takes place on a smooth-scrolling playfield, with 12 superlatively-animated players. When the ball is kicked into the

air, its shadow moves and shrinks on the playing field below. The ball can be kicked, passed, or headered, and the first time you see the goalie dive for a save, you'll shout out loud.

International Soccer is another top-quality piece of Commodore software from England, as is *Simon's Basic*. The program was written by Andrew Spencer, who is now hard at work adapting the player routines to *Basketball* and eventually other sports games. We can hardly wait.

The game is full of little touches that make it a joy to play. You can play against another player or against the computer on any of nine levels of difficulty. At the beginning of the game, you choose the color of jerseys for each team. If you are using a black-and-white display, you can adapt the game for maxi-

Computer Protection

KLEEN LINE[®] CONDITIONER

Prevents:

- Computer Damage
- Lightning Spike Damage
- Brownout Interruptions
- Disruptive Line Noise
- Program Errors

Regulator • Filter • Suppressor

KLR-250A	250 Watt Load	\$291.95
KLR-250A-1S0	250 Watt Load; Patented Filter Isolated Sockets	\$346.95
KLR-500A	500 Watt Load	\$390.95
KLR-500A-1S0	500 Watt Load; Patented Filter Isolated Sockets	\$445.95

Shipping: \$12.75 Land; \$45.50 Air

Ask Your Local Dealer

ESP[®] Electronic Specialists, Inc.

171 South Main Street, Box 389, Natick, Massachusetts 01760

Toll Free Order Desk 1-800-225-4876

MasterCard, VISA, American Express



APPLE II Outperforms IBM PC with MegaTASK PLUS[™]

MegaTASK PLUS[™] is a combined, multi-product hardware-and-software package that provides **MEGABYTES** of **VIRTUAL MEMORY**, **MULTITASKING**, and much more to your Apple or Apple compatible computer. MegaTASK PLUS utilizes the SMARTCHIP[™] (which uses an Intel 8748 Single-Chip Microcomputer), MegaTASK[™] & MegaDOS[™] software, and more. Your system will be enormously enhanced, specifically

- **MULTITASKING** (as many as 16 TASK can execute at one time). Ex. Several printers can be printing while you do data-entry
- **MEGABYTES of VIRTUAL MEMORY**. Largest program size 8 Megabytes. Largest ISAM file 451 Megabytes
- **Mainframe Basic commands** bring machine-language speeds to interpretive Basic.
- **Increased Speeds**. Program execution and file access up to 10 times faster, and data transfer up to 20 times faster

On the application side, the 'PLUS' portion includes:

- Business Graphics, Calc, Database Management and Word Processing Applications Packages
- Report Generators and Strategic Business Analysis programs
- Communications programs
- Text Manipulators and Program Editors
- And much much more!

MegaTASK PLUS includes: the SMARTCHIP, Two Manuals of over 400 pages, Three Double-Sided diskettes packed with software, a 60-Day Trial period, a one-year Warranty, and more

MegaTASK PLUS and one-free-year of our Applications Software Package Series are available at a cost of \$495.00. Contact your Local Dealer or order DIRECT. Add \$4.00 for shipping. Virginia residents add 4% sales tax. We accept VISA and MASTERCARD, Money Order, or Check.

DATA LINK, INC.

1225 Jefferson Davis Hwy., Suite 600

Crystal Gateway II

Arlington, Virginia 22202

(703) 486-5701

*Apple and Apple II are Trademarks of Apple Computer, Inc.
IBM PC is a Trademark of IBM, Inc.

CIRCLE 119 ON READER SERVICE CARD

It you own a Commodore 64^{T.M.}

(or are thinking of owning one)

- be sure that you also get a Calc Result

Calc Result is the worlds most cost effective spread sheet
for the worlds most cost effective computer—The Commodore 64^{T.M.}

Calc Result at home

Use it for loans and mortgages, home budget and cash flow, stock portfolio, personal net worth, IRA analysis, travel expenses, gas and electricity bills, bar charts and many more areas.

In business

Use it for budgets, calculation, simulation, construction, planning etc. Used by managers, salesmen, scientists, doctors, lawyers, dentists, consultants, accountants...

There are two versions of Calc Result

Choose the one that is most suitable for you.

\$79.95



Calc Result Easy

Single page spreadsheet (64 columns × 254 rows). Built in graphics. Formula protection, flexible printout, color, conditional functions and mathematical functions. Delivered on plug-in cartridge. Data storage on cassette or disk.

609-663-0660.

\$149.95



Calc Result Advanced

All functions in Calc Result Easy plus 32 pages (Three-dimensional viewing). Page add, window, split screen (up to four pages on the screen at the same time), and help functions. Delivered on plug-in cartridge plus disk. Requires disk drive.

**Get your Calc Result today! Buy it
at your nearest computer dealer.**

CIRCLE 129 ON READER SERVICE CARD

Commodore 64 is a trademark of Commodore Business Machines.

handic
software inc.

Fellowship Business Center,
Fellowship Rd. B-206,
Mt. Laurel, New Jersey 08054

OVER 500 SOFTWARE COMPANIES ARE AT



TUESDAY-THURSDAY, FEBRUARY 21-23, 1984, SUPERDOME, NEW ORLEANS

If you buy or specify a lot of software for your company, government agency, or educational institution, attending Softcon—the international tradefair and conference for the software industry in New Orleans—will be the most productive and profitable trip you'll make this year.

Nearly 600 different software companies using 1000 displays have filled the massive (400,000 square foot) Louisiana Superdome in New Orleans to showcase over 12,000 software products. These companies will

use Softcon to unveil some of the most revolutionary new software products in the industry's short history. More than 70 seminars, panel discussions, forums and workshops, presented by the world's most renowned computer authorities will update you on the newest products and industry trends.

You can learn more in one or two days from the experts at Softcon than you could in months by reading trade journals or listening to salesmen. You'll see, try out, and compare

brand new software which expands and increases the user-bility and productivity of your existing hardware, and you'll meet new vendors.

Registration is \$30 for exhibits only and \$195 for admission to exhibits and the conference program. For complete information about attending or exhibiting, call or write Northeast Expositions, 822 Boylston Street, Chestnut Hill, Mass. 02167. Tel: 617-739-2000 or 800-841-7000. Because it's carnival season, hotels are filling fast, so call today.

SOFTCON EXHIBITORS

AS OF DECEMBER 1, 1983, MORE ARE BEING CONFIRMED DAILY.

A J & M Associates, ADS Software, AHA, Aardvark/McGraw, Accent Software, Access Technology, Accountants Microsystems, Adapt, Addison Wesley Publishing Co., Advanced Data Institute of America, Advanced Legal Software, Advanced Technology, Adventure International, Agdata, Agri-Data, Allenbach Industries, Alpha Software, Alpine Datasystems, American Business List, American Business Systems, Anderson-Bell, Anitek, Ann Arbor Software, Apple Computer, Applied Data Communications, Applied Data Research, Articulate Publications, Artificial Intelligence, Artsci, ASAP, Ashton-Tate, ASI, Attache Software, Autodesk, Avant Garde, Axel Johnson/Stemmos Ltd., BASF, Baker Hill & Company, Balcones, Baudville, Beaman Porter, Bellesoft, Berge Software, Best Programs, Bluebird Systems, Boeing Computer Services, Boston Documentation Design, Boston Educational Computing, BPI Systems, Brag Systems, Bristol Information Systems, Brown Disc Manufacturing, William C. Brown Publishing Company, Bruce & James Program Publishers, Burroughs Corporation, Lloyd Bush & Associates, Byte Publications, Cal Micro, CDEX, CES Publishing, CV Mosby, Cactus Software, Call Manager, Cap-Gemini, Capro, Cimarron Div/Standun Control, Coade, Commodore Business Machines, Communications Packaging, Communications Research Group, Comprehensive Software, Compute Magazine, Computech Group, Computer Advanced Ideas, Computer Company of America, Computer Development, Computer Distributors, Computer Intelligence, Computer Marketing, Computer & Software Education, Computer Software News, Computer Technology Center, Computer Technology Group, Computerized Business Systems, Computing Canada, Concentric Data Systems, Condor Computer Corporation, Construction Data Control, Continental Software, Coopers & Lybrand, Counselor Systems, Courseware, Creative Freedom Software, Cube Computer Corporation, Cullinet, Cyra, DLM Teaching Resources, DVC, Dagar, Data Base Research Group, Data Management Assoc., Datamost, Datamension, DataPro, Data Systems, Dejon, Digital Equipment, Dilithium Press, DiscoTech, Dow Jones, Dr. Dobbs Journal, Dynaquest (Hill & Knowlton), Dynatech, Dysan Corporation, EWDP Software, Eastman Publishing, Electronic Protection Devices, Emerging Technology, Enigma Logic, Eric Software, Excalibur Technologies, Execucum, Execucore, Fastware, Ferox Microsystems, Financier, First Software, Fisher Business Systems, Flexware, Fliptrack Learning Systems, Forethought, Formaster, Forth, Fox & Geller, Fox

Research, Fuji Photo Film, Funk Software, GAI Systems, GMS Systems, General Datacom, General Looselaf, Gaccop, Gessler Publishing, Gilchrist Software, Gnosis, Government of Ontario, Great Plains Software, Gryphon Micro Products - Handle Corporation, Hansen Management Systems, Harper & Row, Harvard Software, Hawkeye Grafik, Hayden Software, Hayes Microcomputer, Henco, Heritage Holdings, Hermet, Hewlett Packard, Hiller Industries, Houghton Mifflin Company, Hughes Aircraft, Human Edge Software Company, Human Engineered Software - IBM Corporation, I.B. Magazine, IEEE Computer Society, IMSI, ISO World, IXI Sales & Services, Ideaware, Individual Software, Industrial, Infocom, Infodata, Info Design, Information Builders, Information Unlimited Software, Infosound, Infotran, Ingram Book Company, Insoft, Intelligent Designs, Interactive Tele-Marketing, Intermedia, International Micro Systems, International Software Systems, Ivy Hill Corporation - Jones Coliad, Kangaroo Software, KPB Industries, Kent Marsh Ltd., Key Enterprises, Key Software, Knoware, Koala Technologies - Laboratory Microsystems, Lantech Systems, Lassen Software, Leading Edge, Learning Well, Lewis Lee Company, Lifetree Software, Lightning Software, Living Videotext, Lone Star Video, Lotus Development, MAIBasic Four, MBP Software & Systems Technology, M&C Systems, MCBA, MCS Systems, MIS Week, MMCA (Mini Micro Computer Application), M&T, MacMillan Publishing, Management Decisions, Mathtech, McGraw Hill, Media Systems Technology, Medicomp of Virginia, Memron, Menlo Corporation, Metasoft, Micro Associates, Micro Business Applications, Micro Courseware, Micrografix, Micro Information Publishing, Microline, Micro Manufacturing Systems, Micro Market World, Micro Software International, Micro Pro, Micro Rim, Micro Strategies, Microstuff, Micro Tax, Millennium Group, Milton Bradley, Mini Micro Systems, Minuteman Software, Mirror Images, Mosiac Software, Mossland Technology, Mountain Computer, Multisoft, Multisolutions, Mycroft - NCR Corporation, Newline, Nitel, North American Business Systems, Norton Software, Nourneon Corporation - OA Software, Odesta, Optic Graphics, Omega Software, Omnisoft, On Line, Open Systems, Oracle, Osborne-McGraw, Ovation Technologies - PCM, P.C. Telemart, P.C. World, Pacific Data Systems, Palantir Software, Parameter Drive Software (PDS), Paramis, Peachtree Software, Penguin Software,

Perfect Software, Personal Cad Systems, Phaser, Phillips Publishing, Plantronics, Prentice Hall, Primavera Systems, Prime Computer, Professional Conference Assoc., Professional Software, Psychotechnics, Pyscomp, Publisher's Weekly (R.R. Bowker), Publishing Technology, QED Information Sciences, Quadratron, Quarterdeck Office Systems, Quest Research, Queue, Quicksilver - R.R. Bowker (Publisher's Weekly), R.R. Donnelly, Reader's Digest Microcomputer, Real Estate Application, Real World (formerly MBSI), Red Wing Business Systems, Reference Magazine, Relational Data Base Systems, Reliance Plastics & Packaging, REMS Publishing, Reston Publishing, Rocky Mountain Software Systems, Ryan McFarland Corporation - STSC, SMC Software Systems, SAMNA, Howard Sams Company, Satellite Software International, Scarborough Systems, Schuchardt Software Systems, Scott Foreman, Select Information Systems, Sentinel Computer Products, Sight & Sound, Signature Software, Silicon, Simplicity Software, Small Business Computers, Sofstar, SoftCrafter, Soft Kat, Soft Letter, Softtech Microsystems, Softpac/Univex International, Softsel Computer Products, Soft Set, Softsmith, Softrend, Softtron, Software Arts, Software Automation, Softwarebank Dealer Services, Software Digest, Software Distribution Services, The Software Group, Software Ireland, Software Libraries, Software Models, Software News, Software Publishing, Software Solutions, Software Strategies, Software Supermarket, Software Ventures, Software Wholesalers, Software, Sony Corporation of America, Sorcim, The Source, State of the Art, State of the Art Systems, Sterling Swift Publishing, Summit Software, Supersoft, Sybox, Symantec, Symmetric Software, Systems Automation, Systems Management Assoc., System Solutions - T-Maker, TCS Software, Tab Books, Taurus Software, Techland Systems, Technique Learning, Telesun, Teletech, Teleware, Texor Corporation, Think Technologies, Thoughtware Institute, 3M Data Recording Products, Timberline, Timebase, TOM Software, Trac Line Software, Tri Micro International, Tronix, TruTec Software - Unicomm, Universal Custom Products, Universal Software Associates, Uveon - Value Line, Vault Corporation, Verbatim, Viscorp - Wadsworth, Wadsworth Electronic Publishing, Webb Company, Weekly Reader Family Software, Western Electric, Westminster Software, Westware, Whitesmith, John Wiley & Sons, Window - XPI Corporation, XQ Software, Xtrasoft - York Street Software - Zylab

For Registration and Hotel Information call today

Produced by Northeast Expositions, 822 Boylston Street, Chestnut Hill, MA 02167 Telephone: 617-739-2000 or 800-841-7000

CIRCLE 217 ON READER SERVICE CARD

Commodore's Port, continued...

mum contrast, as well. At half-time, the players run off the field into the locker room for a strategy session. The crowd



International Soccer, sure to be a hit.

writhes and shouts when a goal is scored. At the end of the game, a special awards ceremony salutes the winners.

The look and play of this game is so slick, it is like taking part in a real-time cartoon. If you are going to buy only one C-64 game in the rest of time, hold out for *International Soccer*.

Up Against The Wall Street Journal

We here at the magazine have watched with a critical eye as the *Wall Street Journal* has attempted to become computer-literate over the past couple of years. The newspaper has managed to print some of the most entertaining micro misinformation we have ever read. They will never top the time they described the innovative "house" controller for the Apple Macintosh. "Had to be a typo," we told ourselves, until we saw that the term was repeated throughout the article.

Well, guess who got swiped in a recent Section 2 lead story? None other than Commodore. The article, by Dennis Kneale, discussed quality control and shipping problems, which have in fact occurred, as has been reported in previous Commodore's Ports. It further implied that recent dips in Commodore stock were directly due to these problems. Probably true as well.

The article went on, however, to fault Commodore in general for a lack of dealer support, and presented interviews with disgruntled ex-dealers and ex-Commodore employees—each with a rather sharp ax to grind. The concluding paragraph of the piece ran as follows:

"I don't think they could damage their reputation any more," says Alan Friedman, who was Commodore's finance vice president until he left last May over a personal dispute. 'It's not a momentary problem. It's closer to a fundamental flaw in the way Commodore does business.'"

Well okay, Commodore got some bad press. The boss man, Mr. Ahl, filed the story in his *Journal* file, and life went on.

Then a smoking press release surfaced. "Mr. Irving Gould, Chairman of the Board of Commodore International Limited, today issued the following statement in regard to a story relating to Commodore in the *Wall Street Journal*."

In part, the press release said:

"The management of Commodore feels that it has always been treated fairly by the *Wall Street Journal* and today's story, written by a reporter, 26-year-old Dennis Kneale, in no way changes Commodore's view of that publication. It does, however, point to the fact that any large business can be influenced by a relatively young and inexperienced employee and we hope that after Commodore's results for the quarter ending December 31, 1983... are reported, that both Mr. Kneale's editors and all *Wall Street Journal* readers of Mr. Kneale's story remember his name as to the credibility of his leading readers correctly or totally misleading readers as to the prospects for Commodore."

Great sentence, huh? But hang on:

"In regard to the story itself, we believe that numerous assertions attributed to individuals quoted were, in fact, said. Likewise, we know for a fact that much of what was said is not true. . .

"We told him (Kneale) he was getting his information from several small, somewhat unhappy dealers whose credit ratings in many instances could not allow us to ship them more than one product. He quoted Joel H. Kornreich, president of CSI Distributors and Computer Strategies as saying he 'decided to drop the (Commodore) line.' What Mr. Kneale did not say was that Mr. Kornreich was terminated as a Commodore dealer over two months ago and was sued by Commodore for approximately \$1 million that he owes to us. One of his employees is Alan Friedman, a former Commodore employee who, immediately prior to resigning, had been demoted from Financial Vice President to Credit Manager of Commodore's U.S. Subsidiary. Mr. Kneale did not mention any of these three facts when quoting either Mr. Kornreich or Mr. Friedman. All we ask you to judge is whether or not these are credible sources of information upon which a reporter should base part of a story . . ." (We tried to reach Messrs. Kornreich and Friedman for comment, but they were not available.)

"While the last few days have been a difficult time for Commodore shareholders, we do hope that each and every one of you remembers that just because a 26-year-old reporter says it's so,

doesn't make it true."

Holy Cow. You sure told that young whippersnapper good, huh? We think your main points are pretty valid, Mr. Gould, and we agree that the *Wall Street Journal* has provided generally uneven coverage of the microcomputer industry. But you sure were silly to fault Kneale for his age that way. Even if you were addressing only ancient stockholders.

You would do well to remember that the bulk of your own market, as well as your own most innovative minds, are under 30. The mastermind behind *Simon's Basic*, which finally gives the C-64 a Basic worthy of its many features, is all of 16 years old. To generalize about age in that manner is no less pinheaded than to point to race, religion, or nationality in personal criticism. Further, it has made you look bad, buddy.

And I'm not saying this just because I am 26, either. I would like to think that even when I grow as old as you, Mr. Gould, I will abstain from such narrow-minded commentary, or at least keep it off my press releases.

Moral: don't fire off a press release in the heat of the moment. You may put a hole in your own foot.

Apple-64?

We don't usually report on a product based purely on press information, but we can't resist with this one. We have heard rumors in the past concerning Apple compatibility—now we have it in print. Have you heard about AP Modular Pak?

Pioneer Software, in Victoria, BC, states that AP Modular Pak is an inexpensive hardware addition to the C-64 that opens the door to *all* Apple software. It consists of three components:

- The AP Bus, which contains eight standard Apple II peripheral slots and four C-64 expansion slots. It also includes an independent power supply with enough power to run all peripheral devices and the C-64 itself.

- The AP CPU card, heart of the system, which plugs into its own slot on the AP Bus. It handles all conversion from Apple to C-64. "No messy, time-consuming software patches," states the press release. "Just plug it in and turn it on!"

- The AP DOS Card, a peripheral card for the Commodore 1541 disk drive that makes it fully Apple compatible—to be used with your C-64 or Apple II.

According to Pioneer Software, *all* Apple II software and compatible peripherals will function exactly as they do connected to an Apple II. Price? Well nothing is stated outright, but the release says "all this for about the same price as an Apple II disk drive with interface."

Commodore's Port, continued...

Translation: about \$600.

We'll believe it when we see it, and we have asked to see it. If it is real and it works, AP Modular Pak might have a strong future. For more information, contact Pioneer Software, 620 View St. 217, Victoria, BC, Canada V8W 1J6. (604) 381-3211.

Simon Says Soon

We have been waiting quite a while for our release copy of *Simon's Basic*. Deep Boat says that should be coming very soon indeed.

We recently saw a list of commands that will be supported by *Simon's Basic*, and they are so exciting, we just had to pass them on ahead of time. This is only a partial list of commands, mind you.

• **Programming/Debugging Aids:** KEY, to assign a command to a function key; AUTO, to automatically generate line numbers at a specified interval; RE-NUMBER; PAUSE; LIM, to determine the number of the screen line on which the cursor is positioned; CGOTO, to compute the line number to which the program should branch; MERGE; DELAY, to vary the rate of scrolling of a program listing; FIND, to search a Basic program for a character string and display the line where it occurs; TRACE; RETRACE, to resume tracing after editing a program;

DUMP, to display values of all non-array variables; OLD, to reverse a NEW command; and DISAPA, to hide program lines within listings.

• **String Handling Aids:** PLACE, to determine the position of a string within a string; PRINT AT; INKEY; DUP, to duplicate a character string n times; CENTRE, to center a character string on a string line; and FETCH, to limit the type and number of characters for user input.


• **Screen Graphics Aids:** HIRES, to initialize hi-res graphics mode and select plotting and background color; REC, to draw a rectangle; MULTI, to initialize multicolor graphics mode and select three plotting colors; PLOT, to plot a dot; LINE, to plot a line; CIRCLE; ARC; ANGL, to draw the radius of a circle; PAINT, to fill an area with color; BLOCK, to draw a block of color; ROT, to rotate a shape; CSET, to select a character set or recall and display the last hi-res screen; CHAR, to print single characters on a graphics screen; TEXT, to print a string onto a graphics screen; FLASH, to flash a screen color at variable speeds; FCHR, to fill an area of the screen with a character; FILL, to fill a defined area on the screen with a specific character in a particular color; MOVE, to duplicate a section of screen data on another part of the screen; INV,

to invert a specified screen area; LEFT, RIGHT, UP, and DOWN, to scroll a screen window in any direction; and SCRSV, to store data from a lo-res screen on disk or tape.

• **Sprite Graphic Aids:** DESIGN, to allocate memory space for MOBS (movable object blocks, known here as sprites); MOB SET, to initialize a sprite; MMOB, to display and/or move a sprite; and RLOC MOB, to move a sprite between two screen locations.

• **Sound Aids:** VOL, to set volume; WAVE, to set voice, sync, and ring; ENVELOPE, to define a sound envelope; MUSIC, to compose music and save notes, and PLAY, to play music.

As you can see, *Simon's Basic* makes gaining control of the real power of your C-64 much simpler. In addition to the commands summarized above, the language has some other powerful commands. It has structured commands, such as IF THEN ELSE, REPEAT UNTIL, and LOOP EXIT. It allows program procedures to be named and then invoked with the command CALL. It supports global and local variables, and ON ERROR GOTO. Code written in *Simon's Basic* can be as structured as you care to make it.

Catch you next time. Until then, finish that submission! 

New Inmac Catalog jam-packed with computer/ wp supplies. Yours free!

Accurately called "the bible of the industry," it's loaded with great products and ideas for your personal computer, minicomputer or word-processing system. You'll enjoy:

■ **One-stop shopping.** Over 2,000 products to choose from.

■ **Easy ordering.** Mail, phone, or TWX.

Verbal P.O.'s welcome.

■ **Fast delivery.** 24-hour shipment. Over-night emergency shipments available.

■ **45-day trial.** Full refund if not completely satisfied.

■ **Guaranteed quality.** All products field-tested to highest standards.

■ **Lower shipping costs.** Fully stocked distribution centers serving the U.S.

For fastest delivery of your free 100-page Inmac catalog, call 1(800) 547-5444. 1(800) 547-5447 in California.

inmac

Catalog Dept., 2465 Augustine Drive, Santa Clara, CA 95051
Please be sure to include your phone number.

NAME

PHONE

COMPANY

ADDRESS

CITY

STATE

ZIP

CIRCLE 203 ON READER SERVICE CARD



NO! IT IS NEVER TOO LATE!!
TO GIVE YOURSELF, YOUR COMPANY,
A GIFT THAT CAN SAVE YOU \$1,000,000's!!
COST LESS LESS THAN \$20 !!

AND IT CAN GET THIS —

A BRAND NEW PRODUCT

PROTECT THE MONEY YOU HAVE ALREADY SPENT

FROM DUST IN DELICATE PARTS, SCRATCHES AND SURFACE DAMAGE

LOOK

"MANN'S VINYL PRODUCTS" has designed and produced a computer cover that beautifies your room or office and protects at the same time for an astonishingly low price!

- Manufactured of glove leather soft — super easy clean vinyl! This new product is available in your choice of 3 colors.
- The name of your computer and its logo is handsomely silkscreened on your cover.
- Each custom cover is individually fitted to your specific computer model
- Easily the most attractive cover on the market today.
- If not completely satisfied — Return in fourteen (14) days for a 100% refund

CALL US!
24 HOUR PHONE

FREE

• OUTSIDE CALIFORNIA 800-538-6811
• INSIDE CALIFORNIA 800-621-7269
DEALERS AND/OR DISTRIBUTORS INVITED

MANN'S Vinyl Products

LOCAL: (408) 971-7233
761 MABURY ROAD SAN JOSE, CA-95133

CIRCLE 189 ON READER SERVICE CARD



TALKING GAMES With No SPEECH HARDWARE

The season's biggest hits are the new Tymac Talkies—computer games for your Commodore 64™, VIC 20®, Atari® 400, or Atari® 800 that talk without speech hardware. You get the excitement of speech without the cost of a synthesizer!

Tymac Talkies, designed by Game Gems, feature fast arcade action combined with dazzling, high-resolution graphics and software-generated speech. They'll put you in the experience of play with an impact you never before thought possible.

You'll fire power bolts at ruthless attackers with GANDALF; fight strange creatures while you search for treasures of the an-

cient gods with PEGASUS AND THE TRIALS OF PERSEUS; defend family honor as you engage in mortal combat with the SAMURAI; battle deadly bacteria in your body with BIO DEFENSE; try to survive nuclear destruction with FIRST STRIKE! There are nine titles in all, including a typing tutor and a utility graphics program.

Your admission charge to all this? Far lower than the cost of playing other talking computer games. Because we're the only ones that make your computer talk completely by itself.

Tymac's Game Gems Series. The premier name in talking computer games.



TYMAC INCORPORATED
127 Main Street, Franklin, NJ 07416 • 201-827-4050

Commodore 64 and VIC 20 are trademarks of Commodore Electronics Limited. Atari is a trademark of Atari, Inc.
CIRCLE 175 ON READER SERVICE CARD



Outpost: Atari

Winter is upon us in this part of the country. Fewer daylight hours mean that my Atari (and probably yours too) is seeing a lot more use. I have spent the day at the keyboard previewing software and drinking hot chocolate. My eyes are blurry from megadoses of VDU emissions and the thought of a fifth cup of cocoa sends my mind racing back to the thought that has plagued me all day.

I cannot help thinking that software is just too expensive—especially game software. I know I have said it before, but it is really starting to bother me. I also hear this complaint from many other users. When you think about it, \$40 or more for game software in cartridge format and \$30 to \$40 for disk format is rather expensive. For example, does it make sense that two of the most popular games for the Atari computer, *Pac-Man* and *Star Raiders*, if purchased at the list price, would cost more than the Atari 400 they run on? Of course it doesn't.

It is for this reason that I am eager to champion software that is inexpensive and useful. Below are some capsule reviews of software that I think you ought to know about. The programs are either inexpensive, a good value or both. After that, I offer a new version of the Relisting the Unlistable program which originally appeared, complete with a bug, in the September Outpost.

No Frills Game Software

In keeping with the topic of inexpensive software, there is a new line of software from Datasoft selling under the Gentry label. Let me tell you a little

Arthur Leyenberger

about what Datasoft is doing before I describe one of the games. The entire selection of game software from Gentry is deliberately priced to sell for under \$20. In fact, the usual selling price is closer to \$15.

What do you get for a sawbuck and a fin? You typically get both a disk *and* a cassette of the game along with some simple instructions. And you get a game that, a year ago, would probably have been among the top 20 best sellers. Now, before you rush out to buy every piece of Gentry software you can get your hands on, listen up.

I had a chance to take a comprehensive look at three of the new releases. These three games were essentially chosen at random from the dozen or so that hit the stands at once. Two out of three were quite good and kept me occupied for many hours. The other one did not get the same amount of "air time" on my Atari. I have only enough space to describe briefly one of the two better ones.

Like many Atari computer owners, I started out with an Atari VCS game. My wife had surprised me with the most unusual anniversary gift, an Atari VCS and two cartridges. The games were *Asteroids* and *Space Invaders*. It was late that night when we exchanged presents, so video game fever did not set in until the next day.

We played *Asteroids* and *Space Invaders* all day and all night on Saturday. On Sunday, the marathon continued. The leaves did not get raked that weekend.

Our chicken dinner burned in the oven. The cats missed their meals. All work ceased. The obsession was recalled by *Starbase Fighter* from Gentry.

When I first booted *Starbase Fighter*, I could feel all the excitement of that early VCS experience. My thoughts ran immediately to *Asteroids*, because the game begins with vertically scrolling rocks. Your mission is to find the enemy satellite and enter it through the bottom portal. This is done by maneuvering your ship through the asteroid field while dodging enemy space ships that are determined to destroy you.

The vertical and horizontal scrolling is good. Once you reach the satellite, you enter the enemy city. Now you are flying horizontally, maneuvering around the enemy gun emplacements and avoiding contact with enemy scout ships. After safely passing through the city, you arrive at the Alien Brain. There you must destroy the brain by shooting at the moving wall surrounding it. Kill the brain, get your butt back to your home ship, and you will be rewarded with the next, more challenging level.

The asteroids themselves are not depicted in the finest detail, but this is one tough game. For \$15.95 it is a steal. Once you play the game, which was written by John Petritis, it will be difficult to stop. Good job, John.

There you have it. Not exactly "no frills" software, but certainly generic pricing. I hope that Gentry's intelligent pricing policy starts a trend. By lowering the price, the amount of software piracy may also be decreased.

No Frills Spreadsheet

I have been using *VisiCalc* for several

Arthur Leyenberger, c/o Creative Computing, 39 East Hanover Ave., Morris Plains, NJ 07950.



GenTech

THIS MONTH'S SPECIALS

LOTUS 1-2-3	\$359
MICROSOFT Multiplan (Apple II)	\$169
EPSON FX-80 Printer	\$535
C-ITOH Prowriter 1 8510AP	\$369
C-ITOH Prowriter 2 1550P	\$659
NEC Spinwriter 2030 (Centronics)	\$869
U.S. ROBOTICS Password Modem (1200 Baud)	\$359
64K RAM set for IBM-PC	\$55
CABLES Parallel to Parallel	\$35
Serial to Serial	\$40
OTRONA Attaché	\$2495
BASIS 108 (128K, 2 Drives, CP/M 3.0)	\$1795
TANDON Drive (IBM Compatible, 320K)	\$239
FOURTH DIMENSION Super Drive (Apple)	\$219
RANA ELITE I (Apple Compatible, 163K)	\$245
RANA ELITE II (Apple Compatible, 326K)	\$380
RANA 1000 (For ATARI)	\$319
HERCULES Graphics Board For IBM-PC	\$369
MICROLOG Baby Blue (CP/M For IBM)	\$489
TECMAR	
1st Mate Board For IBM (No RAM)	\$239
1st Mate Board For IBM (w/256K)	\$439
2nd Mate Board (2 Serial/2 Parallel)	\$229
CALIFORNIA COMPUTER SYSTEMS	
Super Vision (132 Column For IBM)	\$Call
ORANGE MICRO Buffered Grappler+	
16K	\$179
64K	\$239

CUSTOMER SERVICE & TECH. SUPPORT

401-273-2420

ORDERS ONLY

800-843-4302

150 Broadway, Suite 2212, N.Y. NY 10038

Money Order, Cashier's Ck, Personal Ck (2 Weeks To Clear).
Add 3% MC/VISA, 5% AMEX Charge. Add 2% On COD Orders.
APO Orders Add 10%. Add 3% For Net Terms.
All Returned Non-Defective Merchandise Are Subject To
20% Restocking Charge.
GenTech Reserves the Right to Change Advertised Prices.



COMPUTERS

FRANKLIN	
ACE 1000 w/Color	\$799
ACE PRO PLUS System (ACE 1000 w/color, ACE 10 Drive, 80-Column Card, 12" Monitor, ACE Writer II, ACE Calc, Data Perfect, Personal Financier)	\$Call
ACE FAMILY PAK (ACE 1000, ACE 10 Drive, Time is Money, Snack Attack, Checkers, Window, Welcome, BASIC Manual, Joystick)	\$Call
ACE 1200 (6502/Z80B, 128K, ACE 10 Drive, 80 Column Card, CBASIC, CP/M 2.2)	\$Call
ACE Office Management System (ACE 1200 w/2 ACE 10 Drives, Parallel/Serial Card, WordStar, MailMerge, ACE Calc)	\$Call

COLUMBIA	
Fully IBM Compatible, 128K, Parallel/Serial Ports, Color Board, Super Pak (Over \$2000 Software)	\$Call
w/2 DSDD Drives	\$Call
w/10 MB Hard Disk & 1 DSDD Drive	\$Call
Portable VP w/Super Pak	\$Call



MORROW DESIGNS	
MD2 (64K, 2 DSDD Drives, WordStar, Correct-It, LogiCalc, Personal Pearl, MBASIC, BaZic)	\$Call
MD3 (Same as Above except w/2 DSDD Drives & QUEST Accounting Software)	\$Call
MD11 (128K, 1 1/2 MB Hard Disk & 1 DSDD Drive, Same Software as MD3)	\$2050
MD11 w/Zenith Terminal	\$2395
Multi-User DECISION Series	\$Call
IBM-Compatible Expansion Board	\$Call

CORONA	
PC-1, PC-2, PC-HD	\$Call
Portable PC-1 & PC-2	\$Call

EAGLE	
PC-2 (128K RAM, 2 Drives (640K))	\$Call
PC-XL (128K, 10 MB Hard, 1 Floppy)	\$Call
Spirit XL (Portable Version of PC-XL)	\$Call

SANYO	
MBC 550 (IBM-Compatible, 8088, 128K, 1 DSDD Drive, WordStar, CalcStar, EasyWriter)	\$899
MBC 555 (550 Plus 1 Add. Drive, MailMerge, SpellStar, InfoStar)	\$1199

TOSHIBA	
T300 (8088, 192K, 1 DSDD 640K Drive)	\$Call

SWP Micro Computer Products	
For Kaypro	
Co-Power-88 Board For Kaypro II & IV (8088 w/128K OR 256K, MS-DOS & CP/M 86)	\$Call

FOR IBM PC

AST RESEARCH INC.	
MEGA PLUS II (64K, Serial & Clock/Cal)	\$295
MEGA PLUS II (64K, Serial/Par, Clock)	\$340
MEGAPAK 256K Module	\$299
SIX PACK PLUS (64K, Serial/Par, Clock)	\$295
COMBO PLUS (64K, Serial/Par, Clock)	\$295
I/O PLUS II (Serial Port, Clock/Cal)	\$129

OPTIONS	
Each 64K Increment For Expandable AST Boards Are \$65. (Price Includes Installation)	
Serial	\$45
Parallel	\$45
Game	\$45

QUADRAM	
QUARBOARD (Serial/Parallel, Clock/Cal)	
64K	\$279
256K	\$419

QUAD 512-I (Serial Port, Upgradable to 512K)	
64K	\$239
128K	\$299
256K	\$399
512K	\$619

QUADCOLOR I (Video Board)	\$239
QUADLINK (6502 w/64K)	\$489

MICROFAZER	
Parallel/Parallel	
8K	\$125
16K	\$139
64K	\$199
128K	\$289
256K	\$589
512K	\$899
Serial/Serial, Serial/Parl, Parl/Serial	
8K	\$145
16K	\$159
64K	\$219

**** SPECIAL PRICES ON HERCULES, ****
**** TECMAR & MICROLOG (BABY BLUE) ****
PRODUCTS

FOR APPLE II/Ile, Franklin Ace

ALS CP/M Card	\$299
Smarter II (80 Column Card)	\$145
Printer Mate (Printer Card)	\$59
EPD Surge Protectors	\$Call
FOURTH DIMENSION 16K RAM Card	\$49
80 Column Card w/64K (Ile Only)	\$189
INTERACT. STRU. PKASO Universal	\$125
KOALA TECH. Koala Pad	\$95
MICROTEK Dumping-16	\$159
ORANGE MICRO Grappler+	\$119
PROMETHEUS Graphitti	\$89

HARD DISK



COMREX ComFiler	
(FOR 0X-10, 10MB)	\$1995

CORVUS	DAYONG
6 MB	\$1695
10 MB	\$1645
11 MB	\$2350
15 MB	\$2095
20 MB	\$3150
21 MB	\$2495

PEGASUS	
10 MB Internal For IBM	\$1075
23 MB External (w/Controller)	\$1845

CALL FOR PRICES ON QCS, TALLGRASS & XCOMP

DOT MATRIX PRINTERS



EPSON	
RX-80	\$269
FX-80	\$535
MX-100	\$559
RX-80 F/T	\$399
FX-100	\$725
LQ-1500 (NEW!)	\$Call

OKIDATA	
ML 92	\$449
ML 84(P)	\$979
ML 93	\$729
ML 84(S)	\$1079

MANNESSMANN TALLY	
MT 160L	\$599
Spirit-80	\$339
MT 180L	\$845
1602	\$Call

STAR MICRONICS	
Gemini-10X	\$309
Gemini-15X	\$399
Radex 10 (NEW!) 240 CPS	\$659

INFO RUNNER	
Riteman	\$349
TOSHIBA	
P1350	\$1579

TRANSTAR	
T315 Color Printer	\$469

LETTER-QUALITY PRINTERS

COMREX	
ComRiter I (17 CPS)	\$649
ComRiter II (12 CPS, 5K Buffer, P)	\$479
ComRiter II (Same As Above, Serial)	\$509
ComRiter III	\$Call

DAISYWRITER	
2000 EXP (25 CPS, 48K Buffer)	\$1019

DIABLO 630 ECS/IBM	\$Call
JUKI 6100 (17 CPS, Diablo Compat.)	\$525
NEC Spinwriter 2050 (IBM)	\$Call

QUME Sprint 1140	\$1345
Sprint 1155	\$1495

SILVER-REED	
EXP 550(P)	\$639
EXP 550(S)	\$679
EXP 500(P)	\$439
EXP 500 (S)	\$469

TRANSTAR	
T120, T130 & T140	\$Call

PLOTTERS

AMDEK DXY-100, Amplot II	\$Call
COMREX ComScriber	\$Call
ENTER COMPUTERS Sweet-P	\$Call

HOUSTON INSTRUMENTS (Bausch & Lomb)	
DMP 40	\$831
DMP 29 (8 COLOR 11x17 PAPER)	\$1945
DMP 41 (SINGLE PEN 22x17 INCH)	\$2495
MANNESSMANN TALLY Pixy-3	\$645
STROBE	\$Call

MONITORS



AMDEK	
Video 300	\$149
Color I+	\$Call
Color II+	\$449

COMREX Color, Green, Amber	\$Call
-----------------------------------	--------

PRINCETON GRAPHICS HX-12	\$509
RGB Interface For Apple Ile	\$159

QUADRAM Quadscreen	
(17", 968x512)	\$1595

TAXAN	
KG-12N/UY (12" Amber)	\$135
RGBvision-I (380 Horiz)	\$275
RGB Interface For Apple Ile	\$140
RGBvision-III (630 Horiz)	\$519

TERMINALS

LIBERTY Freedom 100	\$499
QUME 102/102A	\$559/\$579
103/103A	\$879/\$899
108/108A	\$729/\$749

VISUAL All Models	\$Call
WYSE All Models (inc. Color)	\$Call

MODEMS

ANCHOR	
MARK VI (IBM)	\$199
Mark XII	\$Call

HAYES	
Micromodem Ile (w/SmartCom I)	\$249
Smartmodem 300	\$Call
Smartmodem 1200	\$519
Smartmodem 1200B (IBM)	\$439

NOVATION	
Access 1-2-3	\$Call
Cat (Acoustic Coupler)	\$144
J-Cat (Auto Orig/Answer, 300 Baud)	\$109
Apple Cat II (300 Baud)	\$269
212 Apple Cat II (1200 Baud)	\$575
103 Smart Cat (300 Baud)	\$179
103/212 Smart Cat (1200 Baud)	\$419

TRANSEND (Formerly SSM)	
Modemcard w/Source (For Apple)	\$239
PC Modem Card 300 (For IBM)	\$289
PC Modem Card 1200 (For IBM)	\$Call

U.S. ROBOTICS Password	
(1200 Baud)	\$359
VEN-TEL MD212-2E (1200 Baud)	\$399

SOFTWARE

LIFETREE Volkswriter Deluxe	\$Call
LOTUS 1-2-3	\$359
MICROPRO WordStar (IBM, CP/M)	\$309
WordStar Pro-Pack	\$459
WordStar w/Applicard (For Apple)	\$349
MICROSOFT Word	\$Call
SOFTWORD SYSTEMS Multimate	\$329
VISICORP Visi On Series	\$Call

from the publishers of PC

PCjr.

For IBM Personal Computers in
Education, Home and Business Use



THE NEW FOUNDATION FOR IBM PERSONAL COMPUTERS

PCjr.

For IBM Personal Computers in
Education, Home and Business Use

PO BOX 2450, Boulder, Colorado 80322

YES, please enroll me as an Introductory Subscriber to PC JR. for:

- ☐ One year (12 issues) \$14.97 and SAVE 40% ☐ Two years \$27.97 and SAVE 44% ☐ Three years \$38.97 and SAVE 48%

Mr/Mrs/Ms _____ please print name in full

Address _____

City _____ State _____ Zip _____

CHECK ONE: ☐ Payment enclosed ☐ Bill me later
Charge My ☐ American Express ☐ Visa ☐ MasterCard

Card No _____ Exp Date _____

Savings based on full one-year subscription price of \$24.97
Please allow 30 to 60 days for delivery of first issue.

8H187

Fulfill all of your expectations for your IBM personal computer with PCjr, the applications magazine written for you and your household! Whether you're completing your banking from home, cataloging your book, record or recipe collections, teaching your pre-schooler math or the alphabet, preparing your taxes or term papers, or just playing games, PCjr. will enable you to get the most out of all IBM PC's or compatible computers!

PCjr. is written for all members of your household as a tool to utilize your computer to its fullest extent.

SUBSCRIBE TODAY AND SAVE UP TO 48%!

Outpost: Atari, continued...

years. When I first bought the Atari computer, I was pleasantly surprised to learn that this ubiquitous spreadsheet was available for my home computer—then I heard the price. At the time it retailed for \$250. I gulped and bought it anyway, needing it for my work. However, I always thought that it was terribly overpriced.

For those of you who want to use a spreadsheet on the Atari but are not prepared to pay the close to \$200 tariff, there is hope. *Home-Calc* from Sim computer products may meet your needs.

It is billed as the first spreadsheet for the mass market and sells for only \$30. What do you get for one-sixth the cost of *VisiCalc*? You get a program that will do most of the financial calculations needed in a home application at the cost of slow execution speed.

Home-Calc requires the Basic cartridge and either 24K RAM (disk) or 16K RAM (cassette). It comes with a small black "security key," similar to the one Synapse's *Filemanager* used to use. The key is inserted into the left joystick port and must remain there for the duration of the session for the program to function.

After the program is loaded, you enter the number of rows and columns that you will be using. From 4 to 26 columns and from 18 to 99 rows are allowed. Since the program displays only the maximum number of cells, a little math is required (rows x columns) to make sure that you are under the limit. Then you are ready to go.

Unlike *VisiCalc*, *Home-Calc* does not allow you to move around the cell matrix entering numbers, labels, and formulas. Instead, you must press the escape key first and respond with a cell address to enter a label, value, or formula. The current entry, if any, is displayed and you have the option of leaving the cell as it was or entering

something new. After your entry is completed, the cells are not automatically recalculated. You must specifically give the **RECALCULATE** command, which takes anywhere from 15 seconds to several minutes to complete.

Five functions may be used: addition, subtraction, multiplication, division, and exponentiation. There is also a **SUM** function for totalling rows or columns. All formulas are calculated from left to right: negative numbers are not allowed in expressions; and parentheses may not be used. A **REPLICATE** command is provided for duplicating the contents of individual or blocks of cells. Worksheets may be saved to and loaded from either cassette or disk, depending on the version you are using. Worksheets may also be printed, but there is no provision for sending control characters to the printer.

Having used *VisiCalc* and other more powerful spreadsheets, I am somewhat disappointed with *Home-Calc*. By comparison, it is slow and not sophisticated. But the comparison is really unfair. *Home-Calc* costs only \$30 and will probably suit the needs of most home users. I suggest you give it a test drive at your local dealer before you decide.

No Frills Program Lister

A company that calls itself XL-Ent Software is immediately suspect in my book. And if they package their programs in plastic baggies with a couple pages of photocopied documentation, I get ready to write them off. But when the product is extremely useful and does not cost more than a couple rolls of quarters, I spread the word.

Such is the case with *Megafont* from XL-Ent Software. Written by Randy Dellinger and Richard Rognlie, this is the dandiest program lister to come down the pike in a long time. Ever wonder how the program listings in this column are printed, including graphics and

inverse video characters? *Megafont*! Have you ever wanted to print your program listings in a computer font, Greek font, fancy font, or a downloaded character set font? *Megafont* does the trick.

The program works with NEC, C. Itoh, and Epson printers and comes with a half dozen fonts that may be printed at 10, 12 or 18 characters per inch. Programs must be stored on the disk in LIST format prior to running *Megafont*. In addition to the program lister, you also get a screen dump utility for Graphics Modes 7+ and 8 and the ability to convert a character set created with a character set editor to a format that can be used with your printer.

If you program in Basic and have one of the printers mentioned above, *Megafont* is the best value you can get for \$20.

No Frills Educational Program

Next to game software, educational software is the most overpriced category for the Atari, or any other machine. You can pay \$40 or \$50 for nothing more than automated drill and practice programs. If you are looking for a drill and practice program with a few nice touches, you should check out the inexpensive *Computer Assisted Math Program* or **CAMP**. This \$20 program was written by Johnny Masuda and is also from XL-Ent Software.

The program is designed for children ages 6 to 10 and, in fact, was written by the author for his daughter. Answers may be entered via either joystick or keyboard, and the digits may be entered from left to right or vice versa. For multi-digit problems, the right to left entry method mimics the way most people solve math problems. Four different levels may be chosen for addition, subtraction, multiplication, and division problems.

There are several other useful features in this program. Each problem is presented in both vertical and horizontal format so that the child gets accustomed to seeing it both ways. The individual problems may be timed or untimed, and the sessions may be printed or saved for future use. If a wrong answer is entered, the correct answer is displayed only briefly. It should remain on the screen for at least 5 to 10 seconds—long enough for the child to study it.

The other minor flaw in the program is the overuse of dazzling graphics. They seem to be included to show off the author's cleverness rather than to add substance to the program. These two minor criticisms aside, **CAMP** is a bargain-basement value that can easily compete with the high-priced spreads.



Overview

- ## BASIC Tutorial

- ## Graphics & Music

- ### Other Options

- Select Choice or hit f7 for Default

The screenshot shows the 'CodePro-64 MUSIC Demonstrator' screen. At the top right is the label 'C.B.4'. Below the title bar is a virtual keyboard with keys labeled Q through S. To the right of the keyboard is a box labeled 'LAST NOTE C'. Below the keyboard is a table with columns: #, WT, PULSE, A, D, S, R, DUR, S/M, OCT. The rows contain numerical values for each column.

#	WT	PULSE	A	D	S	R	DUR	S/M	OCT
0	(23%)	0	0	9	12	18	0	M	C
1	(32%)	0	0	9	12	18	0	M	C
2	(17%)	0	0	9	12	12	20	M	S
3	(6%)	0	0	9	12	12	20	M	S
4	(12%)	0	0	9	12	12	20	M	S
5	(3%)	0	4	10	8	10	20	M	()
6									
7									
8									

Below the table, instructions are provided: "Select line with cursor. Play keyboard, or press [] to edit line or [M] for tuning. Press [G] for Current Mode." At the bottom left, it says "F1-Main T3-Current". At the bottom right, there is a small icon and the text "IS-B".

Outpost: Atari, continued...

Player/Missile Graphics Made Easy

Most Atari computer owners are aware that they have the best game-playing computer on the market. It is also no secret that one of the reasons for this is Atari's unique player/missile graphics system. Unfortunately, learning how to use player/missile graphics is a difficult and time-consuming task. At least it has been until now.

From Don't Ask Software (the folks who brought you S.A.M., the Software Automated Mouth) comes a new product called *The PM Animator*. *The PM Animator* is a set of software tools that allows you to create and then incorporate player/missile graphics routines into your Basic programs. Although no programming experience is required to use this system, some familiarity with Basic will help.

There are two editors in the *PM Animator* system. The *Grafix Editor* allows you to create the images that you want to incorporate into your Basic programs. Up to 16 images can be created and stored in one file. These images are a series of graphics frames, each one slightly different from the previous one. When viewed sequentially, they appear to be animated, much like the individual frames of a movie.

It is really quite easy to edit the graphics images. The player is created pixel by pixel within an exploded view window. Also provided are three other windows of normal size. Typically, the previous, current, and next images in sequence are displayed to allow you to work on the current image.

The *File Editor* allows you to customize the sequencing of the files created with the *Grafix Editor*. In addition to being able to view and manipulate multicolor player sequences, you can also edit, append and copy various parts of your files to create the animation sequence you desire. The *File Editor* is in the form of a 5 by 10 cell spreadsheet that may contain up to 50 separate frames.

Once you have created the animation frames and sequences, there are machine

language subroutines for use in incorporating the graphics into your Basic program. These routines are called by simple *USR* statements and allow you to load ASCII data quickly, clear areas of memory, and move players horizontally and vertically.

The documentation consists of a 79-page owner's manual and tutorial. The first six chapters are devoted to teaching the fundamentals of PM graphics to anyone, even those who are novices at programming. The next five chapters deal with the various features of this powerful graphics development tool. Finally, the last four chapters cover such advanced animation techniques as creating motion multiple players and multi-colored players.

The PM Animator sells for \$45 and is a useful tool for creating player/missile graphics images. It is not a game, but a utility that will greatly aid the serious programmer with the task of creating and animating graphics sequences.

A Request

In the movie "Best Little Whorehouse in Texas," Dom DeLuise plays a character named Melvin P. Thorpe, otherwise called, "The Watchdog." He is an evangelical television personality who is constantly on the lookout for corruption and evil-doers. Like Melvin, I feel like a watchdog on the prowl for software that is reasonably priced and of high quality. Programs that deliver more bang for the buck. If you happen to run across software for the Atari that you think meets these criteria, write and tell me about it. Remember, the watchdog never sleeps.

Relisting The Unlistable, Reprise


In the September 1983 Outpost column appeared a program written by Ernie Rice of Summit, NJ, which allowed an unlistable program to become listable again. As it stands, it works just fine. Unfortunately, however, Ernie had not enclosed the original expression in the extra set of parentheses, which would make it work with the *original* delister code run in the September 1983 Outpost.

We have gotten many calls from folks desperate to re-list code protected in the original fashion.

Thanks once again to Ernie, Listing 1 is a program that will make the originally unlistable program re-listable. This time, Ernie used a different technique to undo the process, which resulted in an even shorter bit of code. There is however, one caveat: If the program you are trying to make listable does not contain any variables, the procedure will not work.

When the program in Listing 1 is run, it asks you for a filename of the unlistable code. Be sure to specify the complete filename, such as "D1:NEATPROG.BAS". The file will then be read into the computer and written back out to the disk under the original name.

As usual, Ernie Rice may be contacted at (201) 277-6785 and welcomes comments, questions, and suggestions on this particular technique or programming in general. Be sure to ask him about his fine line of utility products for the Atari. He is not bashful, and will be glad to tell you all about them.

That's about it. Another exciting adventure into the world of Atari computers. Amid rumors of Atari's imminent demise, you can bet your bippy that I will support the machines until my last breath. Atari computers truly represent the *Zeitgeist* in home computing. 

Firms Mentioned In This Column

Don't Ask Software
2265 Westwood Blvd.
Los Angeles, CA 90064

Gentry Software
9421 Winnetka Ave.
Chatsworth, CA 91311
(213) 701-5161

Sim Computer Products, Inc.
1100 E. Hector St.
Whitemarsh, PA 19428
(215) 825-4250

XL-Ent Software
P.O. Box 5228
Springfield, VA 22150
(703) 644-8881

Listing 1.

```
10 DIM FN$(15),TABLE(4):OPEN #6,12,0,"E:"
20 ? #6;"FILENAME:";:INPUT #6;FN$
30 OPEN #1,4,0,FN$:A=0:TABLE(1)=0:TABLE(2)=0:TABLE(3)=0:TABLE(4)=0:TRAP 60
40 A=A+1:GET #1,X:IF X=22 THEN TABLE(1)=TABLE(2):TABLE(2)=TABLE(3):TABLE(3)=TABLE(4):TABLE(4)=A
50 GOTO 40
60 CLOSE #1:FOR X=1 TO 4: ? TABLE(X):NEXT X
65 IF TABLE(1)=0 THEN ? "ERROR - NO VARIABLES":STOP
70 OPEN #1,12,0,FN$
80 FOR A=1 TO TABLE(1)+2:GET #1,X:NEXT A
90 PUT #1,(TABLE(3)+3)-(TABLE(1)+3):CLOSE #1
```


IBM Images



Ah, February... that most lugubrious month. Cars don't drive during February, they slide sideways on streets covered with the refrozen leavings of the occasional snowplow. Ingress to the car is usually preceded by a protracted session with an ice scrapper, that is, if you were foresighted enough to take it out of the car before the friendly skies of February encased the automobile in six inches of transparent steel (melting point 32° Fahrenheit, 0° Celsius and 273° Kelvin).

In an occasional burst of optimism I unchain the ice scraper from my wrist before proceeding with the duties of the day. The penalty for this mental lapse is two hours of hard labor grooming the windshield with a credit card. The FimbleCharge people gossip at great length about number 4129-544-54325, who required seventeen credit card replacements in February.

The pleasant slide home is followed by an equally amusing bout with the woodstove effluvia. The smell of melting nylon parka signals that the casing of ice around this writer has thawed sufficiently to permit normal movement. There are sound accompaniments to February too—the heart-rending moan of an exhausted battery, the clickity-click of the lighter as the owner of four frozen door locks warms up the car key, less polite noises when the water meter, in a frenzy of thermodynamic reaction, cracks wide open. So, to get into the spirit of the season, so to speak, we cheerfully present...

Susan Glinert-Cole, Suite 211, World Trade Center, Baltimore, MD 21202. Correspondence can only be acknowledged when a stamped, self-addressed envelope has been provided.

Susan Glinert-Cole

Death And Taxes

Lassen Software of Chico, CA has a little package for do-it-yourself wills. (The Chico Town Council, by the way, recently passed an ordinance that provides a penalty of six months in jail and/or a \$1000 fine for anyone caught dropping a nuclear device on the town.) It is tastefully packaged in an unobtrusive pearl gray disk box. They might have chosen a sombre black for the exterior, but no, they lightened things up a bit with the pale gray.

The box contains one disk (sombre black), a manual (medium tan), and quick installation instructions for people who don't like to read manuals (or are running this program in the final moments before dropping into that great Bit Bucket in the Sky). The program was designed by an attorney specializing in wills and trusts.

The manual, which reminds you that the will generated by this program is not valid in the state of Louisiana, is easy to read and thoughtfully written; it takes a good tone about the whole subject without being either threatening or cute. There is also a glossary of legal terms used in the text, for those of us who are unused to talking in terms of pretermitted intestacies regarding escheat under duress. Explanations are provided for all the questions asked in the program. A sample will (the Last Will and Testament of Han Solo) is presented and analyzed paragraph by paragraph. (In case you were wondering, he left all his household articles to his wife, Princess

Leia. One kid, Luke, made out with the space cruiser and the light saber. The second one, Chewbacca, was obviously a prodigal son; he wasn't the direct recipient of any goods or chattels.)

Wills is all question and answer; it asks a question and you type in the reply. It starts off with name, residence, marital status, and progeny, queries you as to any special bequests, executors, and if you want to be cremated if you have no burial plans on tap. There are about 60 questions in all, and the entire process takes about 15 minutes. After all the entries are complete, you are given instructions for printing out as many copies as you like. The will so generated is output with your responses embedded within the appropriate legal jargon in a form ready to sign (or suitable for framing... your choice).

It is a well done program as far as it goes; if you have complex estate planning though, it won't substitute for a good lawyer. It does have one irritating feature. If, after the will is printed you discover that you spelled the name of your husband wrong, you can't go in and change it directly; you must type the whole thing in again. There is a file generated on the disk containing your replies, but there doesn't seem to be any way to rerun the program with a specific reply file.

Tax Preparer, by HowardSoft (for the serious personal computer user) is put up in the lushest, softest, leatheriest-look, gold-stamped binder that it fairly exudes an odour of money, executive three-piece suits, and expensive after-shave lotion. One might expect such a dignified package to have a dignified human interface, and it certainly does. As a matter of fact, it is so dignified, it is

downright ponderous. Written in interpreted Basic, its speed projects an image usually associated with ancient Chinese Imperial processions. I found I could do the arithmetic calculations faster than *Tax Preparer* with a hand-held calculator and a plebian pencil.

The documentation is very good, thorough, and beautifully printed on weighty ecru paper in grave, dark grey ink. There are sections describing the road map for tax preparation, form-by-form hints, preparing the return and generating printouts (including the IRS specifications for these). *Tax Preparer* is kept updated for the current tax year; the updates cost about \$25. Several pin feed 1040 forms are included in the back of the manual and the suppliers of these forms are mentioned in the text.

The program requires a data disk, and will not accept path names for files. This reduced my carefully prepared, hierarchical hard disk directory to a root-volume shambles, and I eventually gave in and used the floppy drives—program disk in A: and data disk in B:. The recommended memory is 96K, although the program can be run in 64K if you can bear to wait around while it “refreshes” itself.

There are several menus in the program for selecting the various options: default program settings, retrieving old files, and choosing one of the 22 different tax forms to work with. Every choice is accompanied by a low, solemn noise that evokes a mood of introspection regarding the validity of the figure just entered. I filled out most of my 1982 return with it, and the program agreed with my own calculations (which relieved me no end). The package has been carefully prepared to take into account the complexity of the whole tax-paying process, and I certainly found it easy to use.

The professional tax preparer will find it simple to manipulate many different client files. The manual provides suggestions for managing the data disks, and the file manager section of *Tax Preparer* is menu-driven and provides meaningful prompts.

HowardSoft has left no stone unturned to offer helpful information about every aspect of taxes that I could think of (which admittedly is not all that extensive). The biggest problem with the program is its incredible slowness, and, while I have to admire the authors of a 20,000-line Basic program, I am really amazed that they didn't bother to compile it. This would help the performance immensely. Professional tax people in particular might find the response of this package extremely trying in the course of a working day.

Announcements

As the leaves fall off the trees, so do new product announcements rain down on the heads of the unwary public. IBM has been particularly prolific this month—high- and low-end hardware made an appearance. Want a mainframe computer on your desktop next to your abacus? Buy the new PC XT/370 and get three computers in one. This computer is really an upgrade of the XT; in fact, the purchase of three boards will let you convert your little personal computer into a maxi-micro (micro-maxi? mini-micro? mega-micro?, nano-maxi?).

Buy the new PC XT/370 and get three computers in one.

The XT/370 begins with the XT and the three new boards convert the unit into an IBM 370 emulator for software developers, a 370 terminal and an XT. One board is an interface for linking the XT to its big brother; one is a half-megabyte memory board; and the third is an emulator board with three custom-designed chips: an 8087 and two 68000's. One 68000 contains the code for about 25 actual 370 instructions, and the second emulates the remainder of the 370 instruction set (except for 15 I/O-related instructions). A systems developer can write and debug a 370 program in the emulator mode, shift to terminal mode to download the program into the batch file queue and then switch to the XT mode for a quick round of *Cosmic Crusaders* while waiting for the 370 to disgorge the printout.

IBM also announced the 3270 Personal Computer. It is kind of a cross between a PC, a 3270 terminal, and a Lisa. Designed for the executive type, it can display up to seven varicolored windows each dealing with a separate application. Up to four windows can be running mainframe programs; two of them can be used as electronic notepads; one window can be devoted to a PC application while the query database package that comes with the 3270 PC is running in another. Information can be interchanged freely among all the windows which, in the finest windowing tradition, can be enlarged and reduced at the touch of a few keys. At the same time you are writing yourself little notes, you can be checking the database for nearby ice cream stores, having a meaningful exchange with an IBM 4300, and playing *Cosmic Crusaders*.

The 3270 has a beautiful new display with a tilt-swivel pedestal, very high resolution, and eight mouth-watering colors. It reminded me of a multi-colored Lisa except, of course, that the application programs are not necessarily integrated, and there was no garbage-can icon on the display. I read today that some company announced a development program that will allow up to 255 simultaneous windows on one screen. It is interesting to speculate about a windowing computer like the 3270, running windowing application programs. Just imagine—900 windows on a 13" display... surely a sight to gladden the heart of even the crustiest S-100 user.

The keyboard is certainly impressive; it was designed to be equally familiar to both PC and 3270 terminal users and has plenty of keys for controlling the windows. Surprisingly, there is no mouse skittering alongside the 3270 to help manage the windows. I assume that someone will quickly remedy this situation. What's a window without a mouse, right?

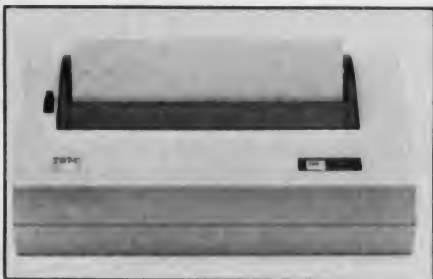
(I admit that I am not crazy about mice in general. People who develop rodent-based software presuppose an end-user with one square foot of empty desk space. Although I usually tidy the desk up at night, by morning a choice selection of computery weed-like stuff has sprouted around the keyboard. A friend of mine solves the space problem by running the mouse up and down his leg. I pointed out the impact this behavior might have on a nylon stocking and he reluctantly agreed that his solution would have repercussions in any number of EEOC offices around the country. Mice also require a certain fine-tuned coordination and are definitely out for the marathon programmer with caffeine-palsied hands.)

Also announced by IBM were the PC Color Printer, priced at \$1995, and the PC Compact Printer, priced at \$175. The Color Printer can print up to eight colors at speeds up to 200 characters a second, and like the Compact Printer, can accommodate single sheet, fanfold, and continuous roll paper.

The Long-Awaited PC Jr.

On the low-end of the IBM family we have, of course, the PC Jr. (at last, at last). I admit to being slightly puzzled by it; it reminds me of an Atari 800 with an Apple IIe price tag. It has a cute little system unit and a separate battery-powered keyboard that communicates with the main unit via an infrared link, allowing you to move the keyboard up to 20 feet away. This is useful for eye tests. A separate transformer box sits on the

IBM Images, continued...



The PC Compact Printer.

desk next to the system unit.

The system unit has two cartridge slots and comes with 64K, expandable to 128K. The microprocessor is (surprise!) an 8088. There is a serial port, game controller, light pen interface, good old cassette Basic, and color graphics capability built into the system unit. The built-in display adapter works with any video, but can display only 40 columns on the screen.

IBM appears to have directed the Jr. to the educational market. Plenty of game cartridges and educational programs are being offered. The classroom environment requires all keyboards to be cabled; the infrared link gets confused if there is more than one PC Jr. (or video recorder) in the room.

Like the original PC, everything is an option. The operating system is one even I didn't foresee: PC-DOS 2.1; it is compatible with the PC and XT. For 80-column buffs, a memory/display expansion board is available, and the expanded model can take an optional thin-line 360K disk drive. Likewise, a host of other doodads, some of which, like the connector for the TV, should really have been included because you can't run the thing without them. An internal modem, thermal printer, joystick, and color printer are available to fluff up the basic system.

The pricing is shown in Table 1.

An absolutely stripped-down system costs \$719; the more flexible and expensive version with disk drive, advanced Basic, and a cheapo 80-column monitor (say \$100) runs the price up to \$1529. This is softly grazing the PC Sr. price range. Jr. can run most of the entertainment software already available, but development software, like compilers, is

Entry level system (64K, keyboard)	\$699
Expanded model (128K, disk drive)	\$1269
Connector for TV	\$30
Cable for IBM color video	\$20
DOS 2.1	\$65
Advanced Basic (aka PC Jr. Basic)	\$75

Table 1.

a problem in a 128K environment.

The question, I suppose, is whether parents want to invest this kind of money to teach a kid Basic and foster alien slaughter, when many computers with similar (but less sophisticated) potential can be had for much less. Because of software compatibility between Jr. and Sr., I expect many people to ignore the game cartridges and educational programs and view the new offering as a low-cost alternative to the PC. One thing Jr. will probably do is force down the price of the Apple IIe. Any price reductions are great for the consumer, but one is left wondering how much money will be left over for research and development of the next generation of the personal computer.

Creative Computing will feature a review of the PC Jr. next month.

Networks

In addition to the maxi-micros, new networks are being announced on a bi-hourly basis. I have had my hands on several the past few months, and most suffer from two large problems: a lack of multi-user application programs and true file and record locking. The lack of file locking is a serious one. Suppose you have opened a file on a shared hard disk and are writing some information in there. Another user has the same idea, and while you are busy updating the file with the latest statistics, the screen suddenly clears of your entered data and shows the data just entered by user number 2.

Many network companies offer a clumsy protection mechanism called file locking. Before you open a file, you issue a LOCK (filename) command. Let's call the file STATS. The shared disk server



The PC Color Printer.

updates a table to reflect that file STATS is now locked. The second user comes along and wants to open STATS. So he issues the LOCK STATS command, and the disk server politely informs him that STATS is in use; the server will continue to parry requests until the first user issues an UNLOCK command. However, if the second user comes along and just opens STATS without giving a LOCK command first, the disk server obediently keeps its nose out of everything and the end result is two people inside the same file simultaneously.

The LOCK approach assumes that everyone using the network is friendly to the system, that is, prior to using any shared, writeable file, a LOCK command will be issued, and an UNLOCK command will be given when the user is finished with the file. Should a user forget about locking the file, or just ignore the whole business as an extra pain-in-the-neck, the network software is powerless to prevent a disaster.

File and record locking can be built into application programs should the network not provide this facility, but here we run into the second problem—there are very few application programs for the IBM PC that are designed to run



The PC Jr.

Learn How to USE A COMPUTER

Train at home in spare time. No previous experience needed.

Be your own computer expert...learn computer applications, programming, and operations...no experience needed.



Now at home in spare time, you can learn everything you always wanted to know about personal computers. How to write your own computer programs. How to use many programs already available. See how they fit into your home or business operations...budgeting, real estate, bookkeeping, inventories, expenses, pricing, profit margins, investments, interest, taxes, shopping lists, vacation planning, addresses, phone numbers, routing...hundreds more. Even programs on foreign languages, computer games and graphics. Never again be at the mercy of a so-called "computer expert." Know what really happens when you have a computer problem with a bank, store, loan company, oil company, utility or anyone else. You'll be able to talk their language...understand why and how things happen.

Experts Show You What to Do...How To Do It

Everything is explained in easy-to-understand language with plenty of examples. Step-by-step directions teach you the fundamentals of basic computer programming. You learn BASIC language...how to use and understand more than eighty BASIC commands and functions. This is not a computer manual. It's a comprehensive 11-lesson course. Yet, because it was especially written for

independent study, you learn everything right in your own home without taking time off your job or changing your lifestyle...without attending a single class.

Now...
all this in one course

- Computer Training
- Computer Programming
- Computer Applications
- Computer Games



An Ideal Way To Learn

Our students tell us they like independent study because it's so convenient. We send all lessons and training materials—including your computer—directly to your home. You choose your own study hours...go as fast or as slow as you want. You waste no time traveling to class...are never turned away because the class is full! As soon as you enroll, you can use our toll-free home-study hotline whenever you need a better understanding about something in your lessons.

FIRST FOLD HERE

FIRST FOLD HERE

NO POSTAGE NECESSARY when you mail this ENTIRE Postage-Paid ad

To Mail—Fold ad in following manner:

1. Remove entire page—tear or cut on dotted line to left
2. Fold page in half on 1st fold lines
3. Fold page again, on 2nd fold lines
4. Tape or glue the 3 open sides and drop in the mail box today.

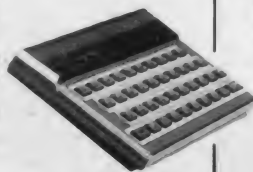
SECOND FOLD HERE

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



We send You Your Own Computer... Included With Course

To give you practical, hands-on experience, you get your own personal computer—the Timex 1500 with 16K memory...plus a cassette recorder that lets you store your programs on tape.



49U

SECOND FOLD HERE

BUSINESS REPLY MAIL

First Class Permit No. 1000 Scranton, PA 18515

Postage will be paid by addressee

ICS COMPUTER TRAINING

Scranton, PA 18515



FIND OUT EVERYTHING YOU WANT TO KNOW ABOUT THIS COMPUTER TRAINING COURSE AND EXCITING CAREERS IN THE WORLD OF COMPUTER—THERE'S NO OBLIGATION!

YES, rush me free facts and color brochure that tells me how I can learn computer applications, programming and operations at home in spare time. I understand there is no cost, no obligation and NO SALESMAN WILL CALL.

Dept. DH014

Name _____ Age _____

Address _____

City/State/Zip _____

CIRCLE 192 ON READER SERVICE CARD

APPLE®, ATARI® and TRS-80® OWNERS!

Three fantastic books from *Creative Computing Press*...

THE CREATIVE APPLE

The best articles and features on the Apple to appear in the past four years of *Creative Computing* are gathered together in this interesting and entertaining book. Revised and updated to include the latest information, this wealth of material gives you dozens of ways to tap the tremendous potential of your Apple. Contents range from graphics, music and educational applications to word processing, software reviews, games and tips on easier programming. Whatever you use your Apple for, you'll find plenty here to help you get more out of it than you ever imagined possible.

The Creative Apple, edited by Mark Pelczarski and Joe Tate. 8½" x 11", softcover, illustrated. \$16.95.

THE CREATIVE ATARI

Whether you're an Atari beginner or seasoned expert, you really shouldn't be without this extraordinarily useful guide to practical Atari "how to" and lore. You get tutorials on Atari graphics, a discussion of Atari memory concepts, programming tips, programs and much more that will help you make better use of your Atari. It's written so the average, non-expert user who knows a little about BASIC and simple programming can easily develop into a skilled Atari user. The contents have appeared as articles, columns

and tutorials in *Creative Computing*, but have been thoroughly revised and updated to insure maximum learning ease.

The Creative Atari, edited by David Small, Sandy Small and George Blank. 8½" x 11", softcover, illustrated. \$15.95.

THE CREATIVE TRS-80

Here's a complete guide to everything you can do with your TRS-80 and how to do it better, faster and more expertly: games, graphics, educational applications, business applications, programming aids, music and a review of handy hardware and peripherals.

Whether you're interested in expense management or educational techniques, symphonies or color composition, this valuable volume will enable you to use your TRS-80 for more exciting and satisfying computing almost immediately.

The Creative TRS-80, edited by Ken Mazur. 8½" x 11, softcover, illustrated. \$15.95.

Registered Trademarks: Apple: Apple Computer, Inc.; Atari: Atari, Inc.; TRS-80: Radio Shack division of Tandy Corp.

For faster service
PHONE TOLL FREE: 800-631-8112
(In NJ call 201-540-0445)

CREATIVE COMPUTING PRESS

Dept. MA1H, 39 East Hanover Avenue
Morris Plains, NJ 07950

CREATIVE APPLE: Send me _____ copies at \$16.95 each* plus \$2 postage and handling. #18R

CREATIVE ATARI: Send me _____ copies at \$15.95 each* plus \$2 postage and handling. #18B

CREATIVE TRS-80: Send me _____ copies at \$15.95 each* plus \$2 postage and handling. #18Y

*CA, NJ and NY State residents add applicable sales tax. Outside USA add \$3 postage and handling charge.

☐ PAYMENT ENCLOSED \$_____

☐ CHARGE MY: ☐ American Express ☐ MasterCard ☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Mr./Mrs./Ms. _____ (please print full name)

Address _____ Apt. _____

City _____ State _____ Zip _____



☐ Check here for FREE
Creative Computing
Catalog.

SCRG PRESENTS

For Your Apple][, Apple][+, Apple //e, Apple /// & Franklin
switch-a-slot



The **switch-a-slot** connects to any peripheral slot of the computer through an 18" cable. The user can plug up to four cards in the **switch-a-slot**. The desired card is chosen by using a switch on the front, and only the selected card draws power. This product is suitable for most peripheral cards. The **switch-a-slot** is perfect for selecting between different printer cards.

- Holds 4 peripheral cards
- Saves wear and tear on delicate connectors
- All connectors are gold plated for reliability
- Only selected card draws power
- Works with most cards

\$179.50

Extend-A-Slot



The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability. **\$34.95**

These products work well with all slow to medium speed cards, such as Modems, Printers, Clock, Music, etc. They are not recommended for high speed data transfer devices such as alternate processor and disk drive controller cards.

These fine products come with a 6 month warranty Available at your local dealer or direct from:

SOUTHERN CALIFORNIA RESEARCH GROUP

Post Office Box 2231 - C Add \$2.50 for shipping,
Goleta, CA 93118 \$5.00 outside U.S.A. &
(805) 685-1931 Canada. CA add tax.

VISA, MASTERCARD accepted

Apple is a trademark of Apple Computers. Franklin is a trademark of Franklin Computers.

IBM Images, continued...

in any environment other than a single-user one. Lotus 1-2-3 cannot discriminate between separate users (yet) and so has no control over file locking either; it is designed to service only one user and can't know about a network environment.

There is a third problem pertaining to networks that is not terribly visible right now, because people don't fully realize the potential value of a network to their organization. Networks are presently viewed as a means to share expensive equipment (hard disks, letter-quality printers) and large databases. What hasn't yet crept into the office is the concept of the customized network, one that will present a particular network application and environment to sales, another to production, a third to accounting, and yet another to customer service. Right now, everyone is just putting single-user programs onto a shared disk and calling that networking. It is, in a limited way, but there are unplumbed depths to the entire concept that have not begun to be addressed.

There are two networks on the market right now (one of which was announced recently) that have pinpointed these problems and are designed to be flexible and secure. The two have very different philosophies, but both are elegant implementations.

Novell's Sharenet uses an IBM XT or PC with a fixed disk as a dedicated file server. The server runs its own operating system called Netware, which allows several very interesting things to go on in the network environment. First, any computer using any operating system can potentially be a member of a Sharenet system. When a user station boots Sharenet software, a shell is loaded around the local operating system. The function of the shell is to act as a translator from the user station to the file server. All that is required is a selection of appropriate shells; they are currently available for CPM/86 and PC-DOS 1.1 and 2.0, and Novell is planning to offer more.

Second, because Netware was designed as a multi-user operating system (PC-DOS was not, don't forget), all the appropriate file and record locking is built into the system. Most networks use a disk server concept, that is, a shared hard disk which can be accessed by multiple users. When a user needs something from the shared hard disk, he taps the disk server on the shoulder to prepare it for a little action, but the user station does all the physical file openings and closings. Not so in Sharenet. A user transmits a request to the file server and the file server does the actual file manipulations. This control prevents the

messy multiple-writer programs of most other networks.

Novell is presently addressing the problem of application software designed to run in the Sharenet environment. If the utilities that come with Sharenet are any indication, the application packages will be extremely well done. Sharenet also includes a multi-user multi-addictive game on their network, called Snipes. They tell me it is available as a stand-alone for the PC. If it arrives, you will hear more about it.

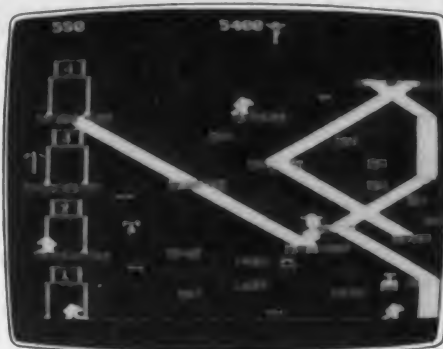
SofTech Microsystems has announced its network software, Liaison, which also answers all the above problems, but in a different way. The set of software includes the UCSD p-System operating environment, disk and print server software, application packages, and a set of development tools for designing customized distributed software packages. Liaison is an open system: the architecture is fully documented, and software developers are encouraged to use this information, as well as support from Softech, to write application software.

Any computer that runs the p-System already can upgrade to Liaison which, by the way, incorporates the upgraded UCSD p-System version IV.2. Five application packages are currently available: word processor, spreadsheet, executive calendar, query database manager, and electronic mail. They are designed specifically for the multi-user environment and incorporate genuine file and record locking.

The spiffy enhancements are non-rodent, multi-colored windowing capabilities and an on-line help facility, as well as a standard user interface for all the software. The development tools package is potentially the most interesting offering. With it, a developer can customize a network to a particular situation. SofTech's demonstration at their press conference showed an in-house system for routing and handling customer service calls to the appropriate people, who can then draw on several databases for client history and problem resolution. I thought it was neat. Liaison is unique in a world rife with humdrum shared hard disks and electronic message packages.

Random Notes

Loathe to have IBM owners miss out on a good thing, Micro Fun has released their game *Miner 2049er* for the PC. The miner hero must climb through ten screens of a uranium mine in an effort to reach the surface. Needless to say, various difficulties present themselves during the climb, including mutants, holes in the gridwork and an ever-ticking clock. I haven't seen the game myself,



Miner 2049er.

but the gamevine says it is challenging and addictive.

The PC Users' Group of Colorado, nee the Denver Users' Group meets the last Thursday of every month, except November, in the Capital Federal Savings Building, 1913 Broadway, Boulder, CO. For more information, contact: Howard Weissmann, President, PC Users' Group of Colorado, P.O. Box 944, Boulder, CO 80306. (303) 443-5528 (evenings).

Firms Mentioned In This Column

Lassen Software
P.O. Box 1190
Chico, CA 95927
(916) 891-6957

HowardSoft
8008 Girard Ave., Suite 310
La Jolla, CA 92037
(619) 454-0121

SofTech Microsystems
16885 West Bernardo Dr.
San Diego, CA 92127
(619) 451-1230

Novell Inc.
1170 Industrial Park Dr.
Orem, UT 84057
(800) 453-1267

Micro Fun
2699 Skokie Valley Rd.
Highland Park, IL 60035
(312) 433-7550

PC Jr.
IBM
Entry Systems Division
P.O. Box 2989
Delray Beach, FL 33444

IBM XT/370 and 3270 Personal
Computer
IBM
Information Systems Group
900 King St.
Rye Brook, NY 10573



TRS-80 Strings

For the fifth anniversary of this column (which means 60 times 4200-plus words, or a total of more than 2.5 million words), we examine the TRS-80 Model 4P Transportable computer, a book on how to write faster TRS-80 Basic, *Color Scripsit* for word processing, and the *Quikpro+Plus 2* automatic program-writer, request information about a graphics course, and look at a short program that provides a fascinating power-up greeting.

TRS-80 Model 4P

Take the disk drives out of a TRS-80 Model 4, squeeze them thin, turn them 90 degrees, and put them back at the right of the screen. Move the power switch, reset button, and screen controls to the left of the screen.

Then saw off the Model 4 keyboard, squeeze it thin, and round off the edges. Put a case (with a handle at the far end) around the screen and drives, and leave room below the screen to store the keyboard. Add a latch-on cover.

Now you have (Figure 1) the new TRS-80 Model 4P, the first item in the RSC-10 catalog that came out last year. The 4P weighs 26 pounds, two pounds heavier than the late Osborne I, or about as much as seven Model 100 Micro Executive Workstations. That is why Radio Shack calls the 4P "transportable," and "a completely portable version of our Model 4 computer," rather than a portable computer.

The 4P, at \$1799 for the minimum 64K version, is \$155 more than the 64K Model 4 with two disks. The Model 4P modem board is \$149.95.

The main selling point of the Osborne I was that the \$1795 price included CP/M, *WordStar*, *MailMerge*, *Super-*

Stephen B. Gray

Calc, *CBasic*, and *MBasic*. With the 4P you get Microsoft Disk Basic and the TRSDOS 6.0 operating system.

However, it is just possible that Radio Shack may eventually decide to go after the transportable market in a big way, and offer the 4P "bundled," with a stack of software, perhaps for even less than the current \$1799. As one Computer Center salesman said, "At some time in the future, we could look to see who is

left standing, and cut them off at the knees."

But don't let these conjectures make you put off buying a 4P, which may well never be offered bundled.

Fast Basic

A fascinating book published by John Wiley & Sons that shows you how to write Basic programs that run much faster than in standard TRS-80 Basic is *Fast Basic: Beyond TRS-80 Basic*, by George A. Gratzner with Thomas G. Gratzner, in paperback for \$14.95.

You learn how to write faster Basic



Figure 1. The TRS-80 Model 4P is a transportable version of the Model 4, with thin-line disk drives and a detachable keyboard.

1984 Business Activity Planner

Imagine! A complete Appointment Book, Financial Record Keeping System, Travel Information Guide, Health and Fitness Aid and Directory... All in one book!

No matter how organized and successful you are today, our Planner will make you even better in the future... or your money back!

**IT'S A
GREAT
GIFT
IDEA,
TOO!**

IT'S AN APPOINTMENT BOOK! SEE-A-WEEK CALENDAR

■ A full week... at a glance! Time planning becomes easy when your appointments, meetings, luncheon and dinner engagements and special activities are in front of you.

HALF-HOUR TIME SCHEDULING

■ Convenient scheduling... seven days a week.

THINGS TO DO TODAY

■ Keep track of important follow-ups, telephone calls and correspondence.

SEVEN SNAP-LOCK RINGS

■ The seven ring format insures that your pages won't pull out... unless you want them to!

BEAUTIFUL, SOFT, LEATHER-LIKE BINDER

■ Padded front and back, your 9½ x 11½ Planner is comfortable to carry. You can take it with you wherever you go. The sturdy, permanent bookmark always keeps you in the right week and the two inside pockets enable you to keep all your important papers in your **1984 Activity Planner**.

YOUR CHOICE OF IMPRINTS

■ Order the 1984 Business Activity Planner for everyone in your office... and select the cover imprint for

each person! Available with Business Activity Planner, Chairman of the Board Activity Planner, Executive Woman Activity Planner, or Executive Activity Planner.

IT'S MUCH MORE!

■ Each Section is Index-Tabbed for Instant Retrieval of Information.

FINANCIAL RECORD KEEPER

- 12 Income and Expense Reports
- 1984 Business Tax Calendar
- Executive Compensation Checklist
- Personal Investment Portfolio

HEALTH AND FITNESS AID

- Fat - Cholesterol - Calorie Charts
- Value of Various Exercises

- Substitution Chart for Better Health
- First Aid Tips

TRAVEL INFORMATION

- Average Temperatures for Most Major Cities
- Rank and Population of the Top 100 U.S. Cities
- Traveling Distances
- Toll-Free Telephone Numbers for Major Airlines, Auto Rentals, Hotels, Motels and much more!

MISCELLANEOUS

This section is filled with valuable information including Principal Holidays, French and California Wine Vintage Charts and more.

DIRECTORY

Places all emergency and important telephone numbers at your fingertips.

ZIFF-DAVIS ACTIVITY PLANNER P.O. Box 16-2354, Miami, FL 33116

Please send me the following 1984 Activity Planners at \$38.95* each plus \$5 per copy postage and handling. Outside U.S.A. add \$10 per copy postage and handling.

Specify quantity for each cover imprint ordered:

- ____ Business Activity Planner(s)
- ____ Chairman of the Board Activity Planner(s)
- ____ Executive Woman Activity Planner(s)
- ____ Executive Activity Planner(s)

QUANTITY DISCOUNTS (on total number of Planners)

6-20	10% off	(\$4 P&H each)
21-50	15% off	(\$3 P&H each)
51-or more	20% off	(\$2 P&H each)

☐ Payment enclosed. ☐ American Express ☐ Visa ☐ MasterCard ☐ Purchase Order enclosed.

Card No. _____ Exp. Date _____

Signature _____

Name _____ (please print)

Company _____

Address _____

City/State/Zip _____

*Florida residents add 5% sales tax.
SATISFACTION GUARANTEED or return
CC2 within 10 days for a prompt refund!

FOR FASTER SERVICE CALL TOLL FREE
800-327-1969
(In Fla. and Canada call (305) 595-8744)



COMPUTER DISCOUNT PRODUCTS

CDP guarantees the lowest available price!

You pay our discounted price or
the lowest advertised price in this issue.

Proof of price rests with customer. Excludes typographical errors, items out of stock & products sold through authorized outlets unless we are also authorized.



MICROSOFT

A.L.D.S.	75.99
APPLESOFT COMPILER	116.99
BASIC COMPILER	239.99
COBOL COMPILER	559.99
FLIGHT SIMULATOR (IBM)	34.99
MOUSE (IBM)	129.99
MULTI-TOOL BUDGET	109.99
MULTI-TOOL FIN. STMT.	69.99
SOFTCARD II	215.99
SOFTCARD PREMIUM (Ile)	359.99
64K IBM SYSTEMCARD	295.99
WORD	\$CALL

MULTI-PLAN 165.99

SPINNYAKER

ALPHABET ZOO (new)	19.99
DELTA DRAWING	32.99
FACEMAKER	21.99
FRACTION FEVER (new)	21.99
KINDERCOMP	19.99
MOST AMAZING THING	26.99
SNOOPER TROOPS	27.99
STORY MACHINE	21.99



APPLE HARDWARE

CDP 16K RAM CARD	39.99
Printer Card & Cable	39.99
Fan w/surge, 2 outlets	39.99
DAN PAYMAR Lower Case 1 (rev 1-6)	25.99
Lower Case 2 (rev 7)	19.99
DARK STAR Snapshot II	89.99
EASTSIDE Wildcard	119.99
FOURTH DIMENSION Drive	219.99
HAYES Micromodem IIe	\$CALL
HOME Repeat Key	19.99
KOALA PAD	89.99
KRAFT Joystick	44.99
KRAFT Paddles	31.99
LEGEND 128K Ram	359.99
MICRO-SCI Drive	219.99
MOUNTAIN CPS Card	159.99
NOVATION Applegate II	259.99
Applegate Upgrade 1200 Baud	309.99
ORANGE MICRO Grappler +	119.99
Butterboard	119.99
Butter Grappler +	179.99
PADDLE ADAPPLE	24.99
SATURN 128K Ram	379.99
Accelerator II	444.99
Neptune 64K	199.99
Neptune 128K	299.99

ALS CP/M 3.0 279.99

INFOCOM

DEADLINE	32.99
ENCHANTER	32.99
PLANETFALL	32.99
SUSPENDED	32.99
WITNESS	32.99

STARCROSS ZORK I, II, III ea. 24.99

QUADRAM

APIC (APPLE /// PARALLEL)	129.99
ERAM 80 column 64K IIE	\$CALL
MICROFAZER	\$CALL
QUADBOARD I or II (64K)	269.99
QUADCOLOR I	234.99
QUADCOLOR II	209.99
QUAD 512+(64K)	219.99
QUADCHROME MONITOR	499.99

QUADLINK 479.99



APPLE SOFTWARE

BPI (GL, AP, AR, PAY, INV)	299.99
BRODERBUND Arcade Machine	44.99
Bank Street Writer	27.99
Drol	26.99
Loderunner	26.99
CENTRAL POINT Copy II+	25.99
DATAMOST Aztec	26.99
Kids & Apple, VIC, COMM, ea.	14.99
DATASOFT Canyon Climber	17.99
Zaxxon	29.99
DLM Alien Addition	Sch-37.99, H-27.99
Aliigator Mix	Sch-37.99, H-27.99
Demolition Division	Sch-37.99, H-27.99
Dragon Mix	Sch-37.99, H-27.99
Meteor Multiplication	Sch-37.99, H-27.99
Minus Mission	Sch-37.99, H-27.99
Verb Viper/Word Invasion	37.99
Word Man/Word Master	37.99
Word Radar/Spelling Wiz	37.99
EPYX Crush Crumble Chomp	22.99
HAYDEN Piewriter	94.99
Sargon II	26.99
L&S Crossword Magic	39.99
LEARNING CO Bumble Games	29.99
Bumble Plot	26.99
Gertrudes Puzzle	29.99
Juggles Rainbow	19.99
Magic Spell	26.99
Moptown Parade	26.99
Rocky's Boots	33.99
LIGHTNING MasterType	29.99
MICROLAB Data Factory	229.99
Miner 20-49er	27.99
ODESTA CHESS	53.99
Odin	37.99
PENGUIN Graphics Magician	38.99
SIERRA ON LINE Frogger	24.99
Screenwriter II	89.99
Ultima II	44.99
General Manager	169.99
ULTRASOFT Serpents Star	29.99
Mask of the Sun	29.99
VISICORP	\$call
MICROPRO	
InfoStar/Wordstar	259.99
Wordstar Pro	389.99



KENSINGTON MICROWARE



SYSTEM SAVER

- Surge Suppression
- Fits Apple Stand
- Dual Outlet
- U.L. Listed
- Great Gift!

\$65

ACCESSORIES

3 Ring Disk Sheets (10)	7.99
Flip 'n File (original)	17.99
Flip 'n File w/Lockray (25)	17.99
Flip 'n File w/Lockray (50)	27.99
HAYES 300 Baud Smartmodem	199.99
1200 Baud Smartmodem	474.99
Library Case	1.99
NOVATION J Cat	104.99
NOVATION 103/212 Auto Cat	429.99
NOVATION 103 Smart Cat	169.99
NOVATION Expansion Mod.	29.99
Power Strip w/surge	17.99
Printer Stand Small (plxgls)	24.99
Printer Stand Large (plxgls)	29.99
RIBBONS - Brother	\$CALL
MX & FX 80	4.99
MX & FX 100	7.99
OKI 82, 83, 92, 93 & Gem	2.99
USI Compumod RF MOD	34.99

Fingerprint (Epson Enhancer) 44.99

380Z Letter-Quality Printer 999.99

MONITORS

AMDEK	\$CALL
PRINCETON RGB HZ-12	489.99
QUADCHROME RGB HX-12	499.99
TAXAN 12" Amber 18 mh	139.99
TAXAN 12" Green 18 mh	139.99
USI P1 9" Green 20 mh	116.99
USI P1 12" Green 20 mh	119.99
USI P1 3 12" Amber 20 mh	146.99
USI P1 4 9" Amber 20 mh	136.99
USI 1400C Color Composite	288.99
OSBORNE Monitor Cable	\$CALL
Ile to Princeton	139.99

TAXAN 420 RGB (AP, IBM) 499.99

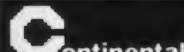


ALPHA PLOT	24.99
APPLE MECHANIC	19.99
BEAGLE BASIC	24.99
DOS BOSS	15.99
DOUBLE TAKE	24.99
FLEX TEXT	19.99
FRAME-UP	16.99
PROMTO DOS	19.99
TIP DISK #1	14.99
TYPEFACES	14.99
UTILITY CITY	19.99

ALL OF ABOVE 234.99



APPLE WRITER PRE-BOOT	14.99
CHARACTER ROMS	24.99
ENHANCER II	99.99
FUNCTION STRIP	34.99
HARDSWITCH	16.99
MICROMODEM CHIP	24.99
PS10	169.99
SOFTSWITCH	25.99
ULTRATERM	249.99
ULTRATERM PRE-BOOTS	\$CALL
VIDEOTERM	199.99
VIDEOTERM W S/S + INV	219.99
VISICALC PRE-BOOT	39.99



APPLE SOFTWARE 1983 BOOK	9.99
ATARI SOFTWARE 1983 BOOK	9.99
APPLE GRAPHICS BOOK	14.99
CPA (GL, AP, AR, PAY) ea.	149.99
FCM/FL 1st CLASS MAIL (AP)	61.99
FCM/FL 1st CLASS MAIL (IBM)	71.99
HOME ACCOUNTANT+ (IBM)	84.99
HOME ACCNT + (KAYPRO, OSB)	59.99
HOME ACCNT + (TI PRO)	119.99
PROPERTY MANAGEMENT	299.99
TAX ADVANTAGE	39.99

HOME ACCOUNTANT (Ap) 44.99

DISKETTES

DYSAN 5" SS/DD (10)	31.99
DYSAN 5" SS/DD (100)	299.99
MAXELL 5" SS/DD (10)	27.99
MAXELL 5" SS/DD (100)	259.99
MAXELL 5" DS/DD (10)	37.99
MAXELL 5" DS/DD (100)	359.99
VERBATIM 5" SS/DD (10)	24.99
VERBATIM 5" SS/DD (100)	229.99
VERBATIM 5" DS/DD (10)	36.99
VERBATIM 5" DS/DD (100)	349.99

Dysan DS/DD 38.99/box 369.99/case

MAIL or PHONE YOUR ORDER:

860 S. Winchester Bl.
San Jose, CA 95128
(408) 985-0400

SAN JOSE
860 S. Winchester Bl., San Jose, CA 95128
(408) 985-0401 Daily 8AM-7PM Sat-Sun-Hol 10AM-5PM

SAN FRANCISCO: 1230 Market St., (415) 626-2244 | **SAN MATEO:** 4228 Olympic Ave., (415) 571-1658
Daily 10AM-7PM Sat-Sun-Hol 10AM-5PM

- No Charge For Credit Cards
- Prices Subject To Change
- Software Sales Are Final
- Min. \$4.00 Shipping Charge
- Purchase Orders Call First



TRS-80 Strings, continued...

two ways. The first uses PEEKs and POKES "to gain control over TRS-80 Basic. With a few PEEKs and POKES, you can send to the printer what is displayed on the screen, merge Basic programs in a cassette system..."

The second method is called Fast Basic, which accesses ROM routines directly: "By learning how to use fewer than 20 machine-language instructions and the names of about 60 ROM routines, we can write our enhancements" to overcome some of the shortcomings of TRS-80 Basic.

After two chapters on binary, there are three on PEEKing and POKEing, one on important Basic tables (array variables, string space, and so on), and another on devices (keyboard, cassettes, and so on). Two chapters on Z80 instructions are followed by five on Fast Basic, including loops and strings, converting simple Basic to machine language, and so on.

If you need extra help, an optional \$19.95 Model I or III disk (or I/III cassette) contains binary/hex tutorials, some tables, a disassembler, and programs to search and modify memory.

Get this book if you are interested in a systematized method for using the ROM routines as spelled out in books such as IJG's famous *Microsoft Basic Decoded & Other Mysteries for the TRS-80*, by James Farvour (reviewed June 1982, p. 234).

The Gratzner book is highly recommended for ROMniks and for anyone interested in faster and more efficient Basic.

Color Scriptsit

Word processing on a Color Computer is fast and easy with Radio Shack's \$39.95 plug-in *Color Scriptsit* Program Pak. You type your letters, themes and reports onto the screen, then edit without the muss and fuss of retyping or correction fluids (Figure 2). When you are ready, you print a perfect text.

The 43-page manual goes into just enough detail to show how to use *Color Scriptsit*, but not so much that you get lost in complicated detail. The manual uses color to show exactly what you see on the screen.

The first menu offers six selections:

- 1 CLEAR MEMORY
- 2 EDIT TEXT
- 3 SAVE ON TAPE
- 4 LOAD FROM TAPE
- 5 PRINT
- 6 CHANGE STANDARDS
(SELECT 1-6)

Edit Text

To start writing a new document, clear the memory by pressing 1 at the Main Menu. The computer asks if you really want to erase the text stored in memory, just in case you pressed 1 by mistake. If you do, press ENTER.

Then press 2, and you get a red screen with a yellow status line at the bottom of the screen:

MEM=15134 Line=032 001-032

The MEM item tells you how much room you have in memory to store text; this is a 16K machine. The number decreases as you type, so you know at all times how much memory is left.

The LINE item tells you how wide the lines are. It is set at 32, but you can change it to any number from 32 to 132, depending on the paper and printer you

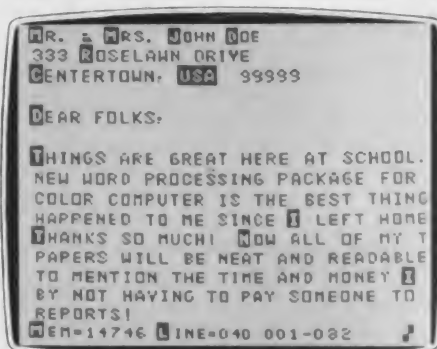


Figure 2. In this example of *Color Scriptsit*, the TV controls are set so that capital letters are shown as white on blue, lowercase as green.

use. The last set of numbers shows which columns of your document are visible on the screen.

Not shown above is an indicator at the end of the status line that shows whether you are in lowercase or uppercase mode.

Not shown above is an indicator at the end of the status line that shows whether you are in lowercase or uppercase mode.

When you type a character, a flashing yellow square cursor moves one space to the right, to show where you are on the screen. If a word won't fit at the end of a line, the entire word will "wraparound" and move to the start of the next line.

The screen can display up to 15 lines. When you reach the end of the fourteenth line, the text scrolls up, and you can't see the first line. It is still in memory, though, and you can look at it any time by pressing SHIFT/up-arrow, which moves the cursor to the start of the text and thus shows the first line.

Color Scriptsit has 23 functions that make typing and editing text quite simple. You can set tabs, just like on a typewriter, for indenting or for creating

columns. You can align text to the left or to the right, or center lines.

You can move the cursor around by using the four arrow keys to make changes, such as delete text (a character or a word at a time) or insert new text in the middle of old text.

You can work with blocks of text: a sentence, paragraph, or group of paragraphs. You can delete, insert, move, and copy these blocks.

With the global search and replace function, you can search for a string of characters (letters, numbers, or symbols) and then change that string to something else. You can change strings one at a time, or all of them at once.

Color Scriptsit finds words in your document that might be hyphenated and thus reduces the amount of blank space at the end of lines.

If you print long documents, you may want to make them look more professional by adding headings (at the top of pages) and footers (at the bottom). You type headings and footers only once, but they are printed on every page.

Save On Tape

You can save text on cassette tape, using file names so you can later load the file you want.

Color Scriptsit can be used with *Color Basic* programs. Save the Basic data files or programs in ASCII, and you can call them up from *Scriptsit*. Or you can write Basic programs with *Color Scriptsit*, and call them up from Basic.

Changing Standards

Press 6 at the Main Menu to change any of the default values used by *Color Scriptsit*, which sets text width at 32, lines per page at 6, the first page number at 1, print spacing at 1, margin width at 0, and so on.

Color Scriptsit Summary

The last two pages of the manual provide a quick-reference summary of all the functions, most of which are provided by the SHIFT, BREAK, and arrow keys, alone or in various combinations with numbers 0 to 9.

Color Scriptsit is easy to use, and the only problem is that the text isn't as easy to read on the screen as on the black-and-white TRS-80 screens. Only capital letters are displayed on the screen, which makes things a little easier, because lowercase letters on the Color Computer are even harder to read. To differentiate, capital letters are yellow on a red background; this can be reversed by pressing BREAK and 2.

In the \$49.95 disk version of *Color Scriptsit*, lowercase letters can be displayed on the screen, if you wish. You

TRS-80 Strings, continued...

can also do "background printing," i.e., print one document while working on another.

Quikpro+Plus 2

Several "automatic program writers" are available to help you write programs faster and neater. One of the best for the TRS-80 I/III/4 and II (and IBM PC) is *Quikpro+Plus 2* from ICR FutureSoft.

ICR FutureSoft calls *Quikpro+Plus 2* a "File Maintenance/Data Entry Program Generator," which makes it sound quite complicated to use. Not at all. *Quikpro+Plus 2* lets you write programs as though you were using a simple word processor, without having to know a single thing about Basic or any other language. It is menu-driven, for maximum user-friendliness.

Get into Basic, ask for Quikmenu, and you get the five choices shown in Figure 3.

Quikpro Filing Program Generator

You start with the first item, with which you design your screen and create a Basic program (but without having to use Basic) to handle files, manipulate data, calculate and accumulate fields.

On the left side of the screen is a vertical row of letters, A through N, to identify 14 lines. You select the letter of the line you want to work with, and enter the literal data: names, titles, field names, and so on. Some will be followed by input fields, which you identify with the = sign.

The program then asks which field will be the primary key, so you can later locate the record. The next question is: which fields are numbers only? You can specify the fields in which you want numeric data only, to help prevent errors at data-entry time.

When you are asked if there are any calculation fields, you indicate which ones, and the calculations involved. For example,

F#(1)/10+F#(3)
means "divide Field 1 by 10, then add Field 3."

The program asks you to enter Field Comments for each field you created on the screen; these appear in the Program Listing that Quikpro will create.

You can edit or change anything at almost any time.

Quikpro Automatic Instruction Manual

The second item on the main menu prints an instruction manual for a program you created with the Program Generator. The manual isn't just a couple of general paragraphs, but a real manual, seven pages long, complete with a table of contents, printed to center neatly on 8½" x 11" paper.

- (1) Quikpro Filing Program Generator
- (2) Quikpro automatic instructions
- (3) Quikprint Report Generator
- (4) Quikindex - Utility to Index File
- (5) End Program

Figure 3.

Most of the manual is boilerplate, of course, and is the same in all manuals created with *Quikpro+Plus 2*. There are general sections on Using Your New Program, First Time Use, Adding Records, Getting Records, Deleting Records, Updating or Changing Records, and Ending Program.

However, the manual includes two items unique to your program: "the form of your record...displayed on your computer screen," and a printout of all the record fields for your program, including description, length, and type.

The manual, intended for first-time users, is as extensive as some for smaller items of hardware or software. This would be ideal for organizations that develop many file programs and need quick documentation.

Quikprint Report Program Generator

The third main-menu item creates a separate Basic program that prints a report according to a format you design. You can eliminate any fields for the report, enter headings for those retained, enter a title, specify the width of the report and the number of lines printed on a page, total fields, and even print a worksheet.

Quikindex File Indexing Utility

The Quikindex utility program makes your data accessible. You enter the name of the file you want to index, the start and end positions of the key, and the length of the file record, and the utility then locates the information.

The manual notes that Quikindex is provided only for making other files compatible with programs written with *Quikpro+Plus 2*, and is not required for normal *Quikpro* operations.

Quikform And Quiksort

Quikpro+Plus 2, an update of the previous version, consists of a new Program Generator, an upgrade module with Quikform and Quiksort, and a new user's manual. The update is \$45, plus \$2.50 shipping and handling, for those who have the original version.

Quikform is a Free Form Reporting option that lets you create letters and various custom forms and labels, and even print checks.

Quiksort provides high-speed sorting that lets you do alphabetic or numerical sorting and is included automatically in

the programs you create.

Quikpro+Plus 2 also provides graphics for enhancing the display, relational reporting (lets your newly created report programs do record selection), merge data (lets you insert data from your files into the forms you design, such as for form letters), 130-column printing, accessing a record from any field, and specifying how many copies of a report to print.

Quikpro+Plus 2 is \$149, plus \$4.50 for shipping and handling, from ICR FutureSoft. A free Quikline newsletter is mailed to all registered owners; it contains tips on using the products, announcements of new products, and so on.

Quikpro+Plus 2 isn't for everybody; it is not much use for games or such. But it is highly useful in many areas of business (customer filing, library catalogs, quotations, marketing data, and so on), education (student records, tuition data, lab data, tenure records, and so on), and home and hobby uses (club rosters, property records, articles indexes, auto records, crop yields, investments, and so on).

Datagraphics

If any reader has information on the Datagraphics Mini-Instruction Course, I would appreciate hearing about it. The course was mentioned in the December 1980 new products column (p. 172). The item said that "Volume I, Curves, is the first in a series of projects on graphics application programming techniques for the 16K Level II or 4K Level I TRS-80. \$19.95."

The address: Datagraphics, Box 566, Union Station, Endicott, NY 13760. I wrote several times, asking for a review copy, but received no answer.

Short Program 46: Power-Up Greeting


From Houston, TX, Bill Fronek sends a program (Listing 1) he calls *Power-Up Greeting*, and writes: "I think you will find the 'effects' kind of interesting. The program prints a short message on the screen. Lines 700-730 scroll the message up, off the screen, and line 740 repeats the program. Therefore, lines 700-740 can be deleted."

The original program has been narrowed to fit this column. If you delete lines 700-730, you also must remove the GOTO 700 in line 130.

Line 110 puts the display into double-width characters. Lines 200-680 create the letters of a message on the screen with what looks like spinning asterisks, but which are actually fast sequences of different characters that create the illusion of something spinning.

When 9999 is reached at the end of the DATA line, line 130 substitutes a blinking letter O for one of the asterisks in the message; the first FOR/NEXT loop controls how many times the O blinks, while the second two loops control the speed of the blinking. After 30 blinks, the program jumps to line 700, which, with lines 710-730, moves the message

up 20 spaces, off the screen (with a slight pause at each space, controlled by the loop in line 720), and then line 740 causes the whole thing to repeat.

If you don't like the message, you can change it, but that is not so easy. 

Firms Mentioned In This Column

ICR FutureSoft
1718 Kingsley Ave.
Box 1446
Orange Park, FL 32067
(800) 824-7888, Op. 552
CA: (800) 852-7777, Op. 552
AK/HI: (800) 824-7919, Op. 552

Listing 1.

```
100 CLS
110 PRINT CHR$(23);
120 READ P
130 IF P=9999 THEN RESTORE:
    FOR T=0 TO 30:
        PRINT @ 356, "O";:
        FOR S=1 TO 30: NEXT:
        PRINT @ 356, " ";:
        FOR S=1 TO 30: NEXT:
        NEXT: GOTO 700
200 FOR N=1 TO 3
210 PRINT @ P, "-";
220 GOSUB 500
230 PRINT @ P, "/";
240 GOSUB 500
250 PRINT @ P, "!";
260 GOSUB 500
270 PRINT @ P, "<";
280 GOSUB 500
290 PRINT @ P, ">";
300 GOSUB 500
305 NEXT N
310 PRINT @ P, "*";
320 GOSUB 500
330 GOTO 120
500 FOR T=0 TO 5: NEXT
510 RETURN
600 DATA 342,612,474,534,420,
    350,470,356,606,478,406,
    548,472,542,484,414,476,
    598,142,814,174,782,270,
    686,170,786,398,558,166,
    790,526,794,430,162,654,
    302,158,810,154,806,150,
    802,146,798,9999
700 FOR S=1 TO 20
710 PRINT @ 960, " "
720 FOR T=0 TO 20: NEXT
730 NEXT
740 GOTO 110
```

PROFIT LEADER



Creative Computing not only sells itself at a nice profit, it creates awareness of the hardware and software in your store. It's like having another salesperson on your staff—one who *pays you*. One who goes home with customers and continues to influence buying decisions long after you're closed for the day. If you're interested in a low-ticket item with top-of-the-line sales power, let's talk now.



CALL COLLECT:
(212) 725-7679

Or write:
Ziff-Davis Publishing Company
Computers and Electronics
Publications
Retail Sales
One Park Avenue
New York, NY 10016

Minimum order, 10 copies.
We pay all shipping costs to your store.



Computer Outlet

We offer the largest selection of software and hardware
for Apple, Atari, Commodore, IBM and Kaypro at

25 to 40% off retail

1095 East Twain, Las Vegas, NV 89109 • Mon.-Fri. 8 AM to 6 PM, Sat. 9 AM to 5 PM

Apple Business

Artsci		IUS	
Magic Window II	\$ 95	Professional Easywriter	\$115
Magic Pak (Window-Mailer-Words)	\$149	Original Easywriter	\$ 65
Ashton Tate		Original Easywriter	\$ 45
DBase II (reg. Z-80)	\$399	Pro-Easywriter/Mailer combo	\$189
Friday	\$189	Original Easywriter/Mailer combo	\$ 89
Broderbund		Link Systems	
General ledger w/payables	\$329	Datafax	\$119
Accounts Receivable	\$249	Datalink	\$ 62
The Bank Street Writer	\$ 48	Micro Lab	
Continental		The Tax Manager	\$ 95
The Home Accountant	\$ 48	Data Factory 5.0	\$189
F.C.M.	\$ 62	Payroll Manager	\$189
G/L, A/R, A/P, Payroll	Ea. \$159	Micro Pro (All Reg. Z-80)	
Property Management	\$305	Wordstar	\$229
Datasoft		Infostar	\$229
Micropainter	\$ 23	Reportstar	\$205
Lisp Interpreter	\$ 79	4Pak Word-Mail-Spell-Star	\$419
The Basic Compiler	\$ 65	Microsoft	
Einstein Corporation		Applesoft Compiler	\$119
Einstein Compiler	\$ 85	A.L.D.S. (Reg. Z-80)	\$ 79
Einstein Memory Trainer	\$ 59	Multiplan (Apple DOS or Z-80)	\$175
Fox & Geller		Sierra On-Line	
Quickcode (reg. Z-80)	\$189	Homeword	\$ 34
dutil (reg. Z-80)	\$ 65	Screenwriter II	\$ 82
dgraph (reg. Z-80)	\$189	The Dictionary	\$ 65
Howard Software		Screenwriter Professional	\$129
Creative Financing	\$129	The General Manager II	\$149
Real Estate Analyzer II	\$119	PBL Corporation	
Tax Preparer 1983	\$145	Personal Investor	\$ 95
Hayes Microcomputer		Sensible Software	
Hayes Terminal Program	\$ 65	Sensible Speller	\$ 82
Sorcim		Multi Disk Catalogue II	\$ 17
Supercalc (Reg. Z-80)	\$119	Silicon Valley	
Supercalc II	\$199	Word Handler II	\$ 45
Spellguard (Reg. Z-80)	\$125	List Handler	\$ 39
Southeastern Software		"The Handlers"	\$ 75
Data Capture 4.0	\$ 47	Software Publishing	
Data Capture 4.0/80	\$ 59	PFS: File	\$ 85
		PFS: Report	\$ 85
		PFS: Graph	\$ 85

Specials of the Month

Franklin Ace 1000	\$849.00
Elephant Disks s/s	\$ 18.50
Verbatim Disks s/d	\$ 24.00
Maxwell Disks s/d	\$ 30.00
Koala Touch Tablet (Apple)	\$ 85.00
Microbuffer II 32k Parallel (Internal, External)	\$129.00
System Saver Fan	\$ 65.00
The Grappler+	\$129.00
Flip & File Diskette Box w/lock (holds 25)	\$ 18.50
Flip & File Diskette Box (holds 50)	\$ 21.00

Apple Educational

Fractions/Eduware	\$ 34
Decimals/Eduware	\$34
Master Type/Lightning	\$27
Type Attack/Sirius	\$ 27
S.A.T. Word Attack/	
Harcourt Brace	\$ 34
Word Attack/Davidson	\$ 34
Math Blaster/Davidson	\$ 34
Speed Reader II/Davidson	\$ 48
Spellicopter/Designware	\$ 27
Micro Multiplication/Hayden	\$ 20
SongWriter/Scarborough	\$ 27
PictureWriter/Scarborough	\$ 27

Visicorp

Visicalc 3.3	\$165
Visiplot	\$139
Visitrend/Plot	\$199
Visidex	\$165

Graphics & Utilities

Beagle Brothers

Apple Mechanic	\$ 20
Beagle Bag	\$ 20
Flex Text	\$ 20
Frame Up	\$ 20
Typelaces (req's Apple Mechanic)	\$ 15

Penquin Software

Complete Graphics System	\$ 49
Special Effects	\$ 27
Graphics Magician	\$ 39
Additional Fonts & Char. Sets	\$ 15
Complete Graphics System II	\$ 79

Modems / Monitors

Hayes Micromodem II	\$259	Nec JB 1201M	\$169
Hayes Micromodem II w/Terminal Pk	\$299	USI Amber	\$149
Hayes Smartmodem 300	\$209	Leading Edge Gorilla Green	\$ 85
Hayes Smartmodem 1200	\$499	Leading Edge Gorilla Amber	\$ 89
Novation Apple Cat II	\$329		

Printers

Nec 8023	\$ 439	Okidata ML 92P	\$ 469
Nec 3530	\$1599	IDS Microprism 80	\$ 549
Nec 3550	\$1899	IDS Prism 132	\$1429
Diablo 620R (25cps)	\$ 989	Citoh 8510 Prowriter	\$ 365
Diablo 630R (40cps)	\$1729	Citoh F10 Starwriter	\$1349
Epson FX100 FT	\$ 789	Mannesmann Tally 160L	\$ 629
Okidata ML 82A	\$ 399	Gemini 10X	\$ 315
Okidata ML 84P	\$1049	Qume Sprint II	\$1429

To Order Call Toll Free
Information 1-702-796-0296
Inquiries 1-702-369-5523

1-800-634-6766

We accept VISA and MasterCard

ORDERING INFORMATION AND TERMS: For Fast Delivery send cashier checks, money orders or direct bank wire transfers. Personal and company checks allow 3 weeks to clear. Charges for C.O.D. orders are \$3.00 minimum or 1% for orders over \$300. School purchase orders welcomed. Prices reflect a cash discount only and are subject to change without notice. Please enclose your phone number with any orders. **SHIPPING:** — Software: \$3.00 minimum. **SHIPPING — Hardware:** (Please call) **SHIPPING — Foreign Orders:** APO & FPO orders: \$10 minimum and 15% of all orders over \$100. Nevada residents add 5 3/4% sales tax. All goods are new and include factory warranty. Due to our low prices, all sales are final. All returns must be accompanied by a return authorization number. Call 702-369-5523 to obtain one before returning goods for replacement.

CLASSIFIED RATES: Per Word, 15 Word Minimum. **REGULAR:** \$2.85. **EXPAND-AD®:** \$4.28. Ads set in all bold type at 20% premium. Ads set with background screen @ 25% premium. **GENERAL INFORMATION:** Prepayment discounts available. Payment must accompany order except credit card—Am. Ex., Diners, MC, VISA (include exp. date)—or accredited ad agency insertions. Copy subject to publisher's approval; must be typewritten or printed. First word set in caps. Advertisers using P.O. Boxes MUST supply permanent address and telephone number. Orders not acknowledged. They will appear in next available issue after receipt. Closing date: 5th of the 3rd month preceding cover date (e.g., April issue closes Jan. 5th). Send order & remittance to: Classified Advertising, **CREATIVE COMPUTING Magazine**, 1 Park Avenue, New York, N.Y. 10016.

SOFTWARE

FREE SOFTWARE DIRECTORY. Database manager, mailing list, inventory, accounting, payroll. TRS-80, xerox, IBM-PC. Long SASE. 37¢. Micro Architect, 96 Dathan, Arlington, MA 02174. 617-643-4713.

VIC-20 TRS 80 SOFTWARE, HARDWARE—Morse code, RTTY, EPROM, programmer memory. FRANK LYMAN, P.O. Box 3091, Nashua, NH 03061.

TI-99/4A PROGRAMMERS: Affordable Software! Catalog, only \$1. **PROGRAMS SOFTWARE, 1435 Burnley Square North, Columbus, OH 43229.**

VIC-20/COMMODORE-64 Educational Software designed by teachers. Free catalog. **ATHENA SOFTWARE, 727 Swarthmore, Newark, DE 19711.**

TI-99/4A owners. Send for free catalog of new and exciting, low cost software. **DYNAMO, Box 690, Hicksville, NY 11801.**

FREE EDUCATIONAL SOFTWARE CATALOG—Pet, Commodore 64, Apple II+, TRS-80—Island Software, PO Box 300, Dept. G, Lake Grove, NY 11755. (516) 585-3755.

MULTI-LINGUAL SOFTWARE for Spanish, French, German, other languages. Apple II & Iie. **FREE CATALOG. Le Professeur, P.O. Box 301C, Swanton, Vermont 05488. (514) 747-9130.**

ADULT PARTY GAMES, BODY PARTS—\$29.95. Atari 32k disk, also for the Apple II: Partly Software, P.O.B. 3025, Mililani, HI 96789.

WORDPROCESSORS, Courseware, Spreadsheets, Databases, Games. For savings over 15% send S.A.S.E.: Computer Software, P.O. Box 1361, Dept. CE, Bloomington, IL 61702-1361.

INCOME TAX PROGRAM for VIC-20 and Commodore 64. Menu driven, saves tax data on tape/disk, printer output. Form 1040/2441, Schedules A,B,D and G. Available January 1984. Cassette \$49.95, dealer inquiries invited. Send orders/inquiries to: U.C. Software, PO Box 2036, Universal City, TX 78148.

TAX SOFTWARE for your TI, RS, Apple, Commodore (20, 64), IBM-PC. \$20-\$40. Available January 3rd; shipped within 48 hours! SEND FOR FREE DETAILS. **EUGENE BOCK & ASSOCIATES CONSULTANTS, 135 Heartwood Drive, Lansdale, PA 19446, (215) 362-5082.**

MAXELL DISKETTES, MD-1, \$25 a case. Dyan diskettes, use any price in this book. Free shipping. 1-(800) 245-8000. Tape World, 220 Spring St., Butler, PA 16001. (412) 283-8621.

FREE CATALOG OF DISCOUNT SOFTWARE. Specify computer. The Floppy Disk, Box 5392C, North Hollywood, CA 91616.

COMMODORE 64/VIC 20 Games/Educational software. Over 400 titles! Write for FREE catalog! American Peripherals, 122 Bangor St., Lindenhurst, NY 11757.

VITAMIN/MINERAL deficiency program—analyzes your answers to 192 questions concerning your body, then prints a chart showing probable deficiencies. \$89.50. TRS-80 1/111/4, 48K. Call (619) 372-5355. Allied Systems Co, PO Box 245, Trona, CA 93562.

ATTENTION TI99/4A HOME COMPUTER USERS! Four super graphic game programs. Send \$12.00 for data cassette. Alpha Software, 162 Chapel Drive, Churchville, PA 18966.

ATTENTION APPLE, IBM, Commodore, Atari, TI 99/4A users. Extensive selection of software. Send for catalog, specify model. Celijm Enterprises, 3687 Mexico, Westerville, Ohio, 43081. (614) 890-7725 after 4:30.

NEW FOR ATARI OWNERS. Practical program for persons interested in calculating daily caloric/sodium intake. Prepared by Registered Dietician. \$12.50 cassette/\$15.00 disk. DELT Enterprises, P.O. Box 200, Oak Ridge, TN 37831.

VIC-20/C-64 programs (P.D.) 10 cents apiece: specify which computer and storage medium. 1(800) 227-3800, ext. 1605.

DEMONS AND DRAGONS: an exciting adventure game for the Commodore 64. Tape \$10.00. Nicholas Industries, 2357 Aspen Lane N.E., Cedar Rapids, Iowa 52402.

"APPLE II, CIVIL-ARCHITECTURE design software. Hydraulics, hydrology, earthwork, beam design, structural, vertical curve street design, and flood routing. Brochure available. **CIVIL-WARE, 3112 Duffield Avenue, Loveland, CO 80537. (303) 669-0830."**

SUPERIOR VIC-20 SOFTWARE! Educational programs and adventure games. FREE program summaries with price list. Creative Workshop, P.O. Box 2725, Dept. 21, Spring Valley, CA 92077.

DISCOUNT HARDWARE/SOFTWARE—30% Minimum Below Retail. Educational, business, entertainment software for Apple II, Atari 400/800, TRS-80 I/III, TI99/4A, VIC 20, Commodore 64, IBM-PC, Hardware! Gemini 10X-\$290. Okidata \$2A-\$375. **SOFTWARE! Frogger (D)-\$22.50. Visicalc-\$169. ZORK I/II/III-\$25.50 each.** Call for latest low prices! Or send \$1 for complete up-to-date hardware/software catalogue. Specify make. **MULTI VIDEO SERVICES, PO Box 246, East Amherst, NY 14051.**

COMPUTERIZED STOCK MARKET ANALYSIS for Apple, IBM, TRS-80, C64. Learn to make better investment decisions. II Programs on disk. Satisfaction guaranteed. Book \$14.95, Disk \$19.95, Book/Disk \$34.90. \$1.50 for handling. **Dalex Publications, Route 1, Box 970, King George, VA 22485. (703) 663-2694.**

VIC 20 AND COMMODORE 64 OWNERS! We have some terrific home management and educational programs. For free catalogue, send self-addressed, stamped envelope to: Genex, Inc., P.O. Box 1269, Jackson, NJ 08527.

TI-99/4A SOFTWARE ON SALE through February. Send \$1 for catalog today: Texware Associates, 350 First North Street, Wellington, IL 60973.

WE WILL BEAT any price on floppy disks. SSD-Maxell MD-1, \$22.00/10; DYLAN 104-1D, \$34.00/10. DSD-MAXELL MD-2, \$34.00/10; DYLAN, 104-2D, \$41.00/10. Shipping \$3.75 any size. VISA, MC, COD, or prepaid, Toll free (800) 245-6000 TAPE WORLD, 220 Spring St., Butler, PA 16001. (412) 283-8621.

X-RATED X BASIC ADDS PM GRAPHICS. String arrays, 30 new functions to Atari Basic \$129.95. FDOS gives named file handling, DOS 2.0S compatibility to APX fig-FORTH 39.95. Superware, 2028 Kingshouse Road, Silver Springs, MD 20904. (301) 236-4459.

FREE Atari/Commodore-64/TI99-4A/TimeX/TRS80-coco/VIC-20 programs! Send stamps. EZRAEZA, Box 5222-RF, San Diego, California 92105.

SALE! PROFESSIONAL A/R, A/P, G/L, P/R Software. Now \$89.00 each for TRS-80, or 8" CP/M with Micro-soft Basic. Catalog, sample reports \$2.00. MJM, Box 324, Somerset, MA 02726.

TS/1000, ZX/81, TI99/4A, VIC-20 Software. Send for FREE catalog: Midwest Software, 9922 Harwich, Crestwood, MO 63126.

HARDWARE

USED COMPUTER terminals, printers, modems, cables, surplus electronic parts. Specialists: CRT's \$20.00. Modems \$35.00. Catalog \$1.00. Rondure Company, "The Computer Room" CC, 2522 Butler Street, Dallas, TX 75235. (214) 630-4621.

EPSON QX-10, DIGITAL, EAGLE. Epson, Sanyo, Toshiba, Gemini printers. Modems, monitors, accessories, other printers and computers. Send \$1 for detailed price list. **DISCOUNT COMPUTER ACCESSORIES, 445 North Pine, Reedsburg, WI 53959.**

COMPUTER EQUIPMENT/SUPPLIES

COMPUTER PAPER—SAVE \$\$\$—Top quality. Fast shipping. Low single-carton prices. Super quantity discounts. Call A-1, (800) 628-8736 or (213) 804-1270.

FREE! Computer Supplies Catalog—low prices—Satisfaction guaranteed—DATA SYSTEMS, Box 99; Fern Rock, Florida 32730 (305) 788-2145.

FREE 56-PAGE COMPUTER catalog crammed full of thousands of the best buys and lowest prices around! **A.P. Computer Products, 8 Division St., Holtsville, NY 11742. (516) 698-8636.**

ATTENTION APPLE—IBM—Commodore—Atari—TI 99/4A users. G10X \$299.00. Extensive selection software—peripherals—most microcomputers—competitive prices. Catalog. Celijm Enterprises, 3687 Mexico, Westerville, Ohio 43081. (614) 890-7725, after 4:30, weekends. VISA, Mastercard (credit card, 3% handling), certified check, M.O., Ohio residents add 5.5% tax.

COVERS—Fabric, attractive quality custom fitted. All computing, stereo, ham, & video equipment. Dec-Otec, Box 24449, Dayton, OH 45424 (513) 236-9923.

DISCOUNT PRICES on all computer supplies. Call or write for your free brochure! Datacom, P.O. Box 02294, Cleveland, OH 44102. (216) 281-8820.

COMPUTER CLUB

JOIN THE BIG RED APPLE CLUB, a national Apple-user's group with benefits including monthly newsletter and large library of free software. Annual membership \$12. Sample newsletter \$1. **BIG RED APPLE CLUB, 1301 N. 19th, Norfolk, NE 68701 (402) 379-3531.**

FOR SALE/BARTER

LOWEST POSSIBLE PRICES ANYWHERE! Computers Hardware—Software—Printers, Audio, Video, Car Stereo. **ELECTRIFIED DISCOUNTERS, 996 Orange Ave., West Haven, CT 06576 MC/VISA. (203) 937-0106.**

BUSINESS OPPORTUNITIES

COMPUTER CASH—101 exciting, new, sparetime home businesses. Report \$4.50. Associated Research, Box 22485C, Houston, TX 77227.

SMALL COMPUTER BUSINESSES... Over 100 you can start anywhere—anytime. Unique 40 pg. catalog—\$1. C.B.I.E.N., PO Box 4759, Santa Barbara, CA 93103.

MAILORDER OPPORTUNITY! Start profitable home business without experience or capital. Information free. Mail Order Associates, Inc., Dept. 589, Montvale, NJ 07645.

SEND YOUR IDEAS for videogames to PINTEX for professional evaluation. Pintex helps you, the designer, by protecting your ideas, suggesting possible programming variations, and handling the complex business end of marketing your idea. **Pintex Marketing, PO Box 11421, Lynchburg, VA 24506.**

WANTED! MICROCOMPUTER PRODUCTS, Peripherals, Software. We manufacture, market, finance your designs. Large royalties. Write for confidential information kit. Cogent Technologies, 1 Pennsylvania Plaza, Suite 100, NY, NY 10119. (212) 408-1770.

SERVICES

EPSON RIBBONS RE-INKED! For information, SASE: Wade Rogers, 2700 Lemon Tree Lane, Charlotte, NC 28211.

ATARI

NEW computerized "SLOT MACHINE"—Authentic action—Realistic sounds—Seven playing levels. **ATARI 400/800.** Send \$14.95 to Jackpot Tape, 139 West Arboles, Thousand Oaks, CA 91360.

GAMES

TI 99/4A GANGSTER SHOWDOWN game program. Cassette and catalogue \$7.00. Ken Baum, 792 Boxwood, Warminster, PA 18974.

NEW—FOR THE APPLE Iie: "LASER-BASE OMEGA". FUN, CHALLENGING. Disk \$22.50. Kevin Hollis, P.O. Box 134, Blythe, CA 92226.

APPLE GAMES \$4.99. Free catalog. Write: L. Mascera, Rainbow Software, 255 Hillside Ave., Valley Stream, NY 11580.

TIMEX/SINCLAIR

KROK, STAR SEARCH, NOAH'S ARK, finest programs available. Machine language action, graphics. **SASE Brown Cottage, 5486 Bright Hawk, Columbia, MD 21045.**

INSTRUCTION

UNIVERSITY DEGREES BY MAIL! Bachelors, Masters, Ph.D.s ... Free revealing details. Counseling, Box 389-CE02, Tustin, CA 92680.

COMMODORE 64

ARCADE ACTION—MOVIE THRILLS—"Lightcycles", futuristic motorcycle chase-fast machine language for Commodore 64 on Disk or cassette. Send \$15.95 to UNICORN Box 7L, Grays Summit, MO 63039.

COMMODORE 64 OWNERS—Use our calorie management program to lose weight and maintain diet. Flexible database with over 380 entries. DIATRON. \$29.95. Cassette. Donnie Brannen. 166 Noah's Road, Wetumpka, AL 36092.

COMMODORE 64 Casino Pac—includes Blackjack, Poker, Keno, Slots—Graphic Simulations of Vegas video machines—\$39.64/TOUR—Intro to 64's features and capabilities—\$12. (Disk or Tape). Advanced Microwave, 1701 A Park Glen Circle, Santa Ana, CA 92706. (714) 554-6470.

PLANS & KITS

PROJECTION TV ... CONVERT your TV or COMPUTER MONITOR to project 7 foot picture ... Results comparable to \$2,500 projectors...Total Cost less than \$30.00...PLANS AND 8" LENS \$19.95...Illustrated information FREE. Macrocoma-EF, Washington Crossing, Pennsylvania 18977. Creditcard orders 24 hours (215) 736-3979.

APPLE PRODUCTS

APPLE 9-TRACK TAPE DRIVES. Read/write industry standard 800 bpi tapes on an Apple. Call/write for detailed brochure. Electroval Industrial Inc., Box 376-D, Morris Plains, N.J. 07950. (201) 267-1117.

MONEY FOR YOUR OLD Apple 1. I need them for prototype work. Call George, 1-(800) 451-1018.

MAILING LISTS

COMPUTER SHOW ATTENDEES N.Y., N.J.: 15,000 names. \$30/M. P/S labels. For info, (201) 297-2526.

TRS-80

TRS-80 COLOR COMPUTER Software available Chattanooga Choo-Choo Software, P.O. Box 15892, CHATTANOOGA, TN 37415. (615) 875-8656.

USERS GROUPS

FREE VIC-20 and COMMODORE 64 USERS GROUP MEMBERSHIP with software purchase. Why pay to belong to a users group when you don't have to? Benefits: Newsletter, extensive club library, discounts, contests, questions hot-line and more! Free details—(803) 797-1533. Lords of Basic, PO Box 459, Dept. 103, Ladson, SC 29456.

COMPUTER REPAIRS

DON'T THROW OUT your disk drive before calling us! We'll help you diagnose/repair. Call: Micro Tek Digital Group. (512) 258-8472.

MISCELLANEOUS

A NEW NATIONAL WELL established MLM food co. expanding to weight control. Fantastic GF opportunity! Low calorie retorts plus diet plan equals positive loss. Contact Dr. Gilmartin, 1749 Arden, Sacramento, CA 95815. (916) 791-1736.

creative computing's RETAIL ROSTER

A DIRECTORY OF STORES AND THE PRODUCTS THEY CARRY
TO PLACE A LISTING CALL COLLECT: LOIS PRICE (212) 725-4215

ALABAMA

VILLAGE COMPUTERS. 1720 28th Avenue South, Homewood, 35209. (205) 870-8943. Apple, Vector, Graphics, Peripherals, Software, Training and Service.

EAGLE MICROSYSTEMS—Full service/support. Corona, Kaypro, Hewlett-Packard Computers. Specializing in Peachtree-MicroPro Software. 114 West Magnolia, Auburn 36830. (205) 826-3691.

ARIZONA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. PHOENIX—2727 W. Indian School Rd., (602) 279-6247. TUCSON—7109 E. Broadway, (602) 885-6773.

CALIFORNIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ANAHEIM—330 E. Ball Rd., (714) 776-9420. CAMPBELL—2350 S. Bascom Ave., (408) 377-8920. EL CERRITO—6000 Potrero Ave., (415) 236-8870. LA MESA—8363 Center Drive, (714) 461-0110. LOS ANGELES—2309 S. Flower St., (213) 749-0261. POMONA—1555 N. Orange Grove Ave., (714) 623-3543. REDWOOD CITY—2001 Middlefield Rd., (415) 365-8155. SACRAMENTO—1860 Fulton Ave., (916) 486-1575. WOODLAND HILLS—22504 Ventura Blvd., (213) 883-0531.

THE COMPUTER STORE OF OAKLAND—Apple, KayPro, Osborne, Televideo, Texas Instruments. Classes/Services/Financing/Free Parking. 1320 Webster, (946) 412. (415) 763-7900.

VALLEJO—COMPUTER IDEAS, 1029 Tennessee St., 94590. (707) 552-5076. Commodore, Epson, Sanyo. Software/Peripherals. Full Service/Support.

FAIRFIELD—THE SOFTWARE PLACE, 727 Texas Street, 94533. (707) 427-2104. Software, books, magazines, and accessories for your computer. Sale prices everyday!

AMERICAN MICROTREL—884 Lincoln Way, Suite 32B, AUBURN 95603. (916) 885-1172. Corona/IBM, Franklin/Apple, Atari, Commodore. Software, Hardware, Peripherals, Supplies. Books/magazines. Classes/research. E-COM. Buyers Club available. Atari Service (FAN).

ANAHEIM—SOUND ROOM, 1100 W. Lincoln, 92805. (714) 635-8621. Atari, Apple, Commodore—Hardware/Software/Peripherals Support/Training.

COLORADO

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. DENVER—5940 W. 38th Ave., (303) 422-3408.

CONNECTICUT

C & E DISTRIBUTING—Edgewood Drive, Jewett City 06351. (203) 427-0657. Retail outlet and wholesaling for dealers.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. AVON—395 W. Main St. (Rt. 44), (203) 678-0323.

BMC COMPUTER CENTER—107 College St., Middletown, 06457. One stop automation specialists—providing solutions for you! (203) 347-8515.

BLR COMPUTER SOLUTIONS INC. (203) 744-5715. Tele-video Business Systems, Anadex, Diablo, Micropro, MBSI, ABS. Complete turnkey installations!

EXECUTIVE SOFTWARE—Stamford—(203) 359-2604. Dedicated to excellence in microcomputers! Authorized dealer for KAYPRO & ALTOS.

FLORIDA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. HIALEAH—4705 W. 16th Ave., (305) 823-2280. JACKSONVILLE—8262 Arlington Expressway, (904) 725-4554. PLANTATION—7173 W. Broward Blvd., (305) 791-7300. TAMPA—4109 Hillsborough Ave., (813) 886-2541.

NORTHWEST FLORIDA—Computer Center Inc., 7143 9th Ave., Pensacola, 32504. (904) 478-6558. Authorized sales/service/training Commodore, Corona, P.C., others.

GOERINGS' BOOK CENTER—1310 West University Avenue, Gainesville 32603. (904) 378-0363. Books and magazines. Open until 9:00. Sun 1:00 to 5:00.

GEORGIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ATLANTA—5285 Roswell Rd., (404) 252-4341.

MENTOR TECHNOLOGY, 3957 Pleasantdale Road, Atlanta, 30340. (404) 447-6236. Televideo, Eagle, DSM, Pro-writer, Morrow, Business Software. Multi user specialists!

ILLINOIS

VIDEO ETC., 465 Lake Cook Plaza, DEERFIELD, 60015, (312) 498-9669. Other locations: SKOKIE (312) 675-3655, ORLAND PARK (312) 460-8980, BUFFALO GROVE, (312) 459-6677, strong Hard/Software support for Apple, Atari, Kay Pro, IBM-PC

DATA DOMAIN OF SCHAUMBURG, 1612 E. Algonquin Rd., Schaumburg 60195. (312) 397-8700. 12-9 Mon.-Fri., 10-5 Sat. Authorized Sales and Service for Apple II, Apple III, Lisa, Osborne and Alpha Micro Computers. Hewlett-Packard Calculators and accessories. Largest Book and Magazine selection in Midwest. VISA, MC, Amer. Exp. accepted for phone orders.

LOMBARD—COMPLETE COMPUTING, 890 E. Roosevelt. (312) 620-0808. Kaypro, Eagle, Victor, Atari, Commodore 64, Great Software Selection! Service/Training.

FARNSWORTH COMPUTER CENTER—1891 N. Farnsworth Ave., Aurora 60505, (312) 851-3888 and 383 E. North Ave., Villa Park 60181, (312) 833-7100. Mon.-Fri. 10-8, Sat. 10-5. Apple, Fortune, Hewlett-Packard Series 80 Systems, HP Calculators, IDS Prism, SMC, Daisy Writer Printers.

INDIANA

BYTREX COMPUTER SYSTEMS—5958 Stellhorn Rd., Fort Wayne 46815, (219) 485-7511. Atari, Zenith, Sony, Televideo. Hardware/Software, Sales & Service.

KENTUCKY

SOUTHERN COMPUTER SYSTEMS—SHELBYVILLE, 630 Main Street, 40065, (502) 633-5639; LOUISVILLE, 10474 Blue Grass Parkway, 40299, (502) 491-7704. Microcomputers: Northstar, TRS-80, Kaypro, Franklin, Peripherals: Okidata, C. Itoh, Corvus. Software: All major brands. Turnkey Systems. We service all major brands!

MARYLAND

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. BALTIMORE—1713 E. Joppa Rd., (301) 661-4446. ROCKVILLE—5542 Nicholson Lane, (301) 881-5420.

MASSACHUSETTS

SCIENCE FANTASY BOOKSTORE—18 Eliot St., Harvard Square, Cambridge 02138; (617) 547-5917. 11-6 Monday-Saturday till 8 Thursday. Apple, Atari, IBM, TRS-80, and Commodore 64 strategy and adventure games.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. PEABODY—242 Andover St., (617) 531-9330. WELLESLEY—165 Worcester Ave., (617) 237-1510.

RAM COMPUTER CENTER—ACTON, 427 Great Road, 01720; (617) 263-0418. N.E.'s Largest Selection of Personal Computer Software.

MICHIGAN

COMPUTERLAND—35850 Van Dyke, STERLING HEIGHTS 48077, (313) 268-4400; 22000 Greater Mack Ave., ST. CLAIR SHORES 48080, (313) 772-6540, Apple, Compaq, DEC, Epson, Fortune, IBM, Osborne, TI PRO.

MISSOURI

COMPUTER ANNEX—411 South Campbell, Springfield 65806. (417) 864-7036. Franklin, Epson, Hardware/Software, Service, Supplies, Classes.

MONTANA

THE COMPUTER STORE—BILLINGS, 1216 16th St. West, 59102. (406) 245-0092. Apple, Kay Pro, Hewlett-Packard, Commodore. Hardware/Software/Peripherals—Service/Training.

NEBRASKA

RIDGEWOOD COMPUTER SERVICES—Business Computer Specialists. Training, Interfacing, Programming. Automate your office! (402) 733-7090.

NEW HAMPSHIRE

VIDEO STORE—140 Congress, Portsmouth 03801. (603) 431-1211. Osborne and Epson QX-10 for your business/home. Software. Supplies.

COMPUTER HUT of New England—101 Elm, Nashua, 03060. (603) 889-6317. Retail-Mailorder DISCOUNT HOUSE for all your personal computing needs.

NEW JERSEY

COMPUTERLAND, 35 Plaza, Rt. 4 West Paramus, 07652. (201) 845-9303. Apple, IBM, DEC, etc. We know small computers.

Summit 07901. (201) 777-1020. 10-5:30 M-F, 10-5 Sat. Apple, IBM, Wicat. Authorized Dealer Sales and Service.

WAYNE SOFTWARE—1459 Route #23, Wayne 07470. (Across from Packanack Center) Books, Programs, Discount Prices! (201) 628-7318.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ASBURY PARK—1013 State Hwy. 35, (201) 775-1231. FAIR LAWN—35-07 Broadway (Rt. 4), (201) 791-6935.

VIDEO CONNECTION and COMPUTER CENTER OF SOMERSET—900 Easton Avenue, 08873. (201) 545-8733. Atari, Altos, Commodore, IBM. Hardware/Software/Supplies.

SOFTWARE SPECTRUM, 382 Somerset St., North Plainfield, NJ 07060. (201) 561-8777. Programs sold-rented! Apple, Atari, Commodore, TRS-80, IBM PC, others. OVER 1,000 TITLES! 20% DISCOUNT.

EXECUTIVE COMPUTER NETWORK 373 Route 46W, Fairfield. Computer training for professionals. Lotus 1-2-3, dBASE II, Wordstar, MultiPlan, Multimate, Visicalc, IBM PC. (201) 575-5552.

S/S/T COMPUTER CENTER—Pinebrook Plaza Rt. 46 (201) 575-2502-Waynecrest Plaza Rt. 23 (201) 696-0112. Epson, Kaypro, Eagle, Seequa, Franklin, Software, Peripherals.

SOFTWARE STATION—Rockaway Townsquare Mall. Discount microcomputer software, books, peripherals, furniture. Free Educational Catalog! (201) 328-8338.

JEFFERSON COMPUTER CENTER, Lakeside Shopping Center, Jefferson Township, 07849. Atari/Franklin Hardware, Multiple software selections, peripherals, books, magazines. Authorized service. (201) 663-0224.

NEW YORK

COMPUTER WORLD—6464 W. Quaker St., Orchard Park, 14127. (716) 662-4141. M-F: 9-9, Sat: 9-5. Atari, Commodore—VIC-20, 64. Epson HX20, QX10 computers, and printers. Hardware/Software.

SOFTWARE EMPORIUM—151 Mineola/Willis Ave., Roslyn Heights, 11577. (516) 625-0550. LARGEST SELECTION OF SOFTWARE ON L.I.: Apple, Atari, TI, Commodore, IBM and more + hardware/peripherals/books/magazines.

FARMINGVILLE-DATASCAN COMPUTER SYSTEMS, 2306 N. Ocean Ave., 11738. (516) 698-6285. Atari, NEC, KAYPRO, APPLE Compatibles. Business Systems. Software/Peripherals/Service.

ALPHA STEREO—345 Cornelia Street, Plattsburgh 12901, (518) 561-2822. Atari computers and software. Weekdays 10-8, Sat. 10-6, Sun. 12-5.

COMPUTER WORLD—2384 Hempstead Turnpike, East Meadow, 11554; (516) 731-7939. Large selection of Apple, Atari, Commodore software. Featuring business, utility and games. Call for the latest software releases. Authorized Franklin Ace service.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. AMHERST—3476 Sheridan Dr., (716) 835-3090. ROCHESTER—937 Jefferson Rd., (716) 424-2560. N. WHITE PLAINS—7 Reservoir Rd., (914) 761-7690.

RAY SUPPLY—Hardware/Software Discounted! Software Rental Club. Glens Falls (518) 792-5848, Latham (518) 783-7067, Syracuse (Fayetteville) (315) 637-4243, Plattsburgh (518) 561-3870, Malone (518) 483-3241.

NORTH CAROLINA

HICKORY—SIMPLIFIED SOFTWARE, 118 Third Avenue, N.W., 28601. (704) 328-2386. Authorized Zenith Data Systems Dealer. Software for Z100, IBM/PC. DEALER INQUIRIES INVITED.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. GREENSBORO—4620 W. Market St., (919) 299-5390.

OHIO

ABACUS II—1417 Bernath Pkwy., TOLEDO 43615; (419) 865-1009. 4751 Monroe St. (419) 471-0082. 10-6, 10-9 Thursdays. IBM-PC, Epson, Apple, Osborne, Lisa.

NORTH COAST COMPUTERS, 650 Dover Center, Bay Village 44140, 216-835-4345. 10-6 Mon-Fri, 10-8 Tuesday, 9:30-5 Saturday. Apple, Osborne, Vector Graphics, Altos.

TOLEDO—HEATHKIT ELECTRONIC CENTER, 48 South Byrne Rd., 43615, (419) 537-1887. Heath/Zenith Computers, Software, Peripherals.

BARNHART'S COMPUTER CENTER—548 N. Main, URBANA 43078, (513) 653-7257. Atari, KayPro, Columbia. Franklin Software. Service/Training.

OKLAHOMA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. OKLAHOMA CITY—2727 Northwest Expressway, (405) 848-7593.

PENNSYLVANIA

PERSONAL SOFTWARE, 146 Paoli Pike, Paoli, 19355. (215) 296-2726. Software Specialists. Custom Programs, Canned Programs and Peripherals.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. PHILADELPHIA—6318 Roosevelt Ave., (215) 288-0180. FRAZER—630 Lancaster Pike, (Rt. 30), (215) 647-5555. PITTSBURGH—3482 Wm. Penn. Hwy., (412) 824-3564.

RHODE ISLAND

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. WARWICK—558 Greenwich Ave., (401) 738-5150.

UTAH

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. MIDVALE—58 East 7200 South, (801) 566-4626.

VIRGINIA

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. ALEXANDRIA—6201 Richmond Hwy., (703) 765-5515. VIRGINIA BEACH—1055 Independence Blvd., (804) 460-0997.

WASHINGTON

COMPUTERS +, 2504 Jefferson Avenue, Tacoma, 98402. (206) 272-2329. Atari/Commodore Computers. Atari/Commodore/TRS-80 Software. Supplies.

HEATHKIT ELECTRONIC CENTERS—Heath/Zenith Computers, Software, Peripherals. SEATTLE—505 8th Ave., North, (206) 682-2172. TUKWILA—15439 53rd Ave. South, (206) 246-5358. VANCOUVER—516 S.E. Chaklov Dr., (206) 254-4441.

LYNNWOOD—MEDIA MAN—18500 33rd W., Suite B-2 (in the Alderwood Plaza), 206/775-8544. Software and supplies for Apple, Atari, IBM, Commodore.

CANADA

ARKON ELECTRONICS LTD.—409 Queen St. West, Toronto M5V 2A5, (416) 593-6502. Apple dealer, Software/Hardware for Apple, Atari, Commodore 64, VIC-20, TRS-80, and more. #1 in service! Books/Magazines. U.S. Inquiries.

BYTE COMPUTERS-VANCOUVER, 2151 Burrard Street, V6J 3H7, (604) 738-2181. Apple Authorized National Account Dealer. DEC, IMS, MORROWS, QX-10. Hardware/Software/Service/Training.

SABRE COMPUTER SYSTEMS—Unit #1—2810 St. John St., Port Moody, B.C. V3H 2C1. Hardware/Software/Peripherals for business, education and home: Apple, Atari, Commodore, IBM and more. Full Service/Support/Training & Mail Order. U.S. Inquiries.

the creative computer mart

SOFTWARE AND HARDWARE SHOPPERS GUIDE

ONLY \$19.95

Self-Centering



Full X-Y Coordinate Control

360° Cursor Control

2 Firing Buttons

THE AMPOTRONIC SELF-CENTERING JOY STICK FOR APPLE COMPUTERS

Joy Stick Non-Self Centering	\$16.50
Z-80 Card	\$75.00
80 Column Card	\$75.00
16K RAM Card	\$45.00
Fan for Apple, 2 Power Outlets	\$40.00
Power Center, 6 Outlets	\$19.00
RF Module	\$12.00
Computer Paper 15#, 3300 sheets 9 1/2"x11"	\$29.95/box
Diskettes	Call

Include \$2.50 min. for shipping/handling.

NY State residents add sales tax.

Send check or money order to

AMPOC ENTERPRISES INC.
5 BECKMAN ST. SUITE 720, NY 10038
(212) 233-1780

Dealer inquiries welcome

Tired

of looking for reliable Source of Supply?

RUN DOWN

from Looking???

Nervous

about QUALITY??

DISKETTES +

RIBBONS +

ACCESSORIES

Call Bob Kelly Now...

Kelly Computer Supplies

1811 Carl St. • St. Paul, MN 55113

Toll Free ... 800 - 447 - 2929

MN Res. Call Collect. ... 612/644-9030

MEMOREX - DISKETTES



5 1/4 in. DISK STORAGE FOR 17.5c PER DISK

DISKPAGE II™

Finally an affordable notebook storage system that's safe and easy to use.

Each **DISKPAGE II™**:

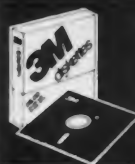
- fits into any standard three-ring loose-leaf notebook.
- holds two 5-1/4" disks securely. They cannot fall out.
- has lots of space for titles, file listings and notes.

PERFECT FOR STUDENTS, INSTRUCTORS, USER GROUPS AND HOME USERS FED UP WITH THE HIGH COST OF DISK STORAGE.

Send check or money order for 35¢ per page (min. order 10 pages) to:

DALY COMPUTER ACCESSORIES CO.
P.O. Box 545
Elmsford, N.Y. 10523

Please add \$1.50/order for shipping & handling
N.Y. State residents add 5-3/4% sales tax
EDUCATIONAL DISCOUNTS AVAILABLE
For sample DISKPAGE II send \$1.00 for s/h.



SAVE MORE THAN EVER ON 3M Scotch DISKETTES!

\$1.95 ea 5 1/4" SSDD (744)
Qty 20 **\$2.70** ea 5 1/4" DSDD (745)
Qty 20

5 1/4" SSDD—96TPI (746) \$2.89 ea
5 1/4" DSDD—96TPI (747) \$3.95 ea
(Specify soft, 10 or 16 sector)
8" SSDD (740) \$2.07 ea
8" SSDD (741) \$2.54 ea
8" DSDD (743) \$3.30 ea
(Specify soft or 32 sector)

3M HEAD CLEANING KITS \$23.00
Lifetime Warranty!

Save even more on quantity orders!

Minimum Order: 20 diskettes. Add \$3.00 shipping
per 200 diskettes. C.O.D. charge \$1.65 additional.

Visa • Mastercard • Checks

For fast service, call

DISK WORLD!

Nationwide: 1-800-621-6827

In Illinois: 312-944-2788

Suite 4806 • 30 E. Huron Street • Chicago, Illinois 60611

Authorized Distributor
Information Processing Products



CIRCLE 342 ON READER SERVICE CARD



OKIDATA

92A
160 CPS
DOT MATRIX
PRINTER

IN STOCK **\$455** LIMITED TIME
ONLY

OKIDATA 93 - 850.00
WABASH DISK 165.00

per case of 100

ss/sd - 165.00 ss/dd 195.00

ss/dd - 275.00 vebatim

dadafife - 245.00

DISK CONNECTION LTD. • 703 451-4100

6641 Backlick Rd.,

Springfield, VA 22150

KAYPRO, EAGLE,

OKIDATA, TRANSTAR

Choice Visa, Mastercard

CIRCLE 343 ON READER SERVICE CARD

Maxell Floppy Disks

The Mini-Disks
with maximum quality.



Dealer inquiries

invited. C.O.D.'s

accepted. Call

FREE (800) 235-4137



PACIFIC EXCHANGES

100 Foothill Blvd. San Luis

San Luis Obispo, CA 93401

In Cal. call (800) 592-5935 or

(805) 543-1037

CIRCLE 344 ON READER SERVICE CARD



flexible disks

Call Free (800)235-4137

for prices and information.

Dealer inquiries invited.

C.O.D. and charge cards

accepted.



**PACIFIC
EXCHANGES**

100 Foothill Blvd

San Luis Obispo, CA

93401. In Cal. call

(805) 543-1037



CIRCLE 345 ON READER SERVICE CARD

THE FORTH FOR THE APPLE™

"Incredible Features at an Incredible Price"

- Complete Forth Word Set
- Full Screen Editor
- Complete Structured 6502 Macro Assembler
- Hi-Res Graphics
- Floating point with all popular functions
- Complete self contained DOS
- Interface to DOS 3.3 Files
- Fifty+ Page Manual
- Strings, Array, Case, Lo-Res, Sound Words, and More!

29.95

COMPLETE! NJ residents
incl. 6% Sales Tax
Minimum system: Apple II, II Plus, or IIe w/48K
and one disk drive; can use language card
and more disk drives if available.

Visa/MasterCard accepted; incl. card #, exp. date
and signature, or send check or M.O. to:

TERRY BROTHERS SOFTWARE

P.O. BOX 29, ROOSEVELT, NJ 08555

(609) 799-9190

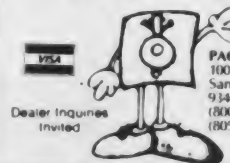
CIRCLE 335 ON READER SERVICE CARD

Scotch Diskettes

Rely on Scotch® diskettes to keep your valuable data safe. Dependable Scotch diskettes are tested and guaranteed error-free. The low abrasivity saves your read/write heads. They're compatible with most diskette drives.



(800)235-4137



PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. Call
(800) 592-5935 or
(805) 543-1037.

CIRCLE 346 ON READER SERVICE CARD

CompuCover™



COVER YOUR INVESTMENT

- Static Free
- Custom Fitted
- Cloth Backed Vinyl
- Clear Plastic

WE COVER ALL SYSTEMS

FROM ADDS TO ZENITH

1-800-874-6391

ORDER LINE

Dealer Inquiries Invited

CompuCover
P.O. Box 324 Dept. B
Mary Esther, FL 32569

Customer
Service
(904) 243-5793
Telex 469783

CALL TOLL FREE

TAX AID TAX AID



FOR VIC 20™ AND
COMMODORE 64™

TAX AID I VIC 20 \$ 19.95

TAX AID II 16K VIC \$ 24.95

TAX AID III C 64 \$ 24.95

Prices listed are for cassette.
Add \$5.00 for disk version.

NORTHLAND ACCOUNTING, INC.

600-N Second Ave

Two Harbors, MN 55616

(218) 834-5012

TAX AID

TAX AID

TAX PREP™

Easy 1983 Taxes for
MULTIPLAN Users

If you use Multiplan, you can't afford not to use TAX-PREP for the fastest, simplest tax preparation ever. Multiplan+TAX-PREP= one of the best, complete personal income tax systems available.

And the price is right!

TAX-PREP is available on Apple II and IBM compatibles (specify machine) for \$89.95. (add 6% tax in PA)

CALL OR WRITE FOR MORE INFORMATION

EZ WARE

17 BRYN MAWR AVE., BALA CYNWYD, PA 19004

(215) 667-4064

SAVE 50% on Scotch® Diskettes

Dealer inquiries invited

5 1/4"	Specify Soft 10 or 16 Sector	prices 10
744D	1 side dbl dens	\$22 30
745	2 sides dbl dens	\$31 00
746	1 side quad 96 tpi	\$33 80
747	2 sides quad 96 tpi	\$45 50
8"	Specify Soft or 32 Sector	
740	1 side sgl dens	\$23 60
741	1 side dbl dens	\$29 00
743	2 sides dbl dens	\$37 80

Checks-VISA-MC-COD Add \$2 Shipping
Call or write for our complete list

LYBEN COMPUTER SYSTEMS
27204 Harper Ave St Clair Shores MI 48081
Phone (313) 777-7780

Authorized Distributor
Information Processing Products **3M**

CIRCLE 336 ON READER SERVICE CARD

POWER LINE PROBLEMS?

SPIKE-SPIKERS™...The Solution!

Minimize equipment damaging spikes and conducted RF noise to or from sensitive equipment. Transient surge protection plus low pass RFI hash filtering. All units 120V 15A



MINI II \$44.95
Wall Mount
3 stage filter
2 sockets

QUAD II \$59.95
Wall mount Dual 3 stage filter
4 sockets & light

DELUXE \$89.95
Dual 5 stage filtered
ckts 8 switch sockets
main switch fuse light

Kalgio Electronics Co., Inc.
65 B4 Rich Rd. Dept C C
Bethlehem PA 18017

Order Factory Direct
215-837-0700

Out of State
800-523-9685

DEALERS INVITED
PA Res. Add 6% • COD add \$3.00 • Shipping

CIRCLE 337 ON READER SERVICE CARD

Educational Programs for —
**ATARI, VIC 20, TI 99/4A
TRS 80 Color Computer
Commodore 64**

only **\$7⁰⁰** per cassette

Alphabet, Physics, Algebra,
Weather, Planetary Positions
and many others.

Now! Offering, also
SAT Preparation
(5 cassettes)

Write for free list:
MOSES ENGINEERING
P.O. Box 11038
Huntsville, AL 35805
Telephone (205) 837-3356

CIRCLE 338 ON READER SERVICE CARD

wabash®
Flexible Diskettes

6 Year Warranty - 100% Certified
FREE DELIVERY

5 1/4" \$160 each 100% 100% 100% 100% 100% 100%	BULK \$140 each 100% 100% 100% 100% 100% 100%
5 1/4" \$189 each 100% 100% 100% 100% 100% 100%	BULK \$170 each 100% 100% 100% 100% 100% 100%
5 1/4" \$275 each 100% 100% 100% 100% 100% 100%	BULK \$244 each 100% 100% 100% 100% 100% 100%

"Call for Quantity Prices"

TOLL FREE
NAT'L
1-800-634-2248
(800-MEGA-BIT)

We accept money orders, certified checks & personal checks (add 3% charge for N.Y. and Mass. and N.D. add 4%)

Software Services
1326 - 25th St S Suite D2
Fargo ND 58103
1-701-280-0121

YOUR SEARCH IS OVER

For all your
Computer Software,
Hardware & Accessories
Great Service - Low Prices

Call 1-800-237-3500
In N.Y. State 212-246-0300

Call or write for our
FREE CATALOGUE

GOREN COMPUTER
P.O. Box 366, Brooklyn, N.Y. 11229

CIRCLE 339 ON READER SERVICE CARD

SPEEDY EPROM PROGRAMMER For APPLE II

Programming any EPROM
2716, 2732, 2732A
2764, 27128
2516, 2532, 2564
in just 30 seconds.
Only **\$119.00**
1 Year Full Warranty

Handwellcorp
4962 El Camino Real Los Altos, CA 94022
Tel (415) 962-9265 (inside Calif.)
1 (800) 821-3628 (outside Calif.)
TLX 171947 HANDWELL LTOS

CIRCLE 341 ON READER SERVICE CARD

JUKI 6100
LETTER QUALITY PRINTER



\$499.

- 18 cps
- Word processing and graphic functions
- Proportional spacing control
- Uses IBM Selectric ribbons
- Compatible with Kaypro, IBM, Apple, Osborne, and others.

Free shipping in U.S.

COMPUTERS and more

2420 University Ave., San Diego, Ca. 92104 To Order (619) 291-1442

YORK 10™ CASSETTES

• LOWER PRICES
• LONGER LENGTHS

DATA TRAC C-06, C-12, C-24

From the leading supplier of Computer Grade Cassettes, new, longer length C-12's (6 minutes per side) provide the extra few feet needed for some 16K programs.

- Premium 5-screw shell with leader
- BASF tape
- Error Free
- Money back Guarantee

ITEM	1 DOZ	2 DOZ
C-06	7.00	13.00
C-12	7.50	14.00
C-24	8.00	15.00
Hard Box	2.50	4.00

SHIPPING-HANDLING \$3.50
NOTE: Outside 48 Cont. States shipping \$3.50 PLUS \$1 per caddy per dozen cassettes per dozen boxes per 48 pieces in Cont. U.S. shipments are by UPS unless Parcel Post requested (California residents add Sales Tax)

FOR IMMEDIATE SHIPMENT USE YOUR VISA OR MASTERCARD Call: 213/700-0330

YORK 10™ Computerware
9525 Vassar Ave. #CR Chatsworth, CA 91311

ICs PROMPT DELIVERY!! SAME DAY SHIPPING (USUALLY)

64K DYNAMIC RAM ICs
200 ns (r) \$5.97
150 ns (r) \$6.09

These are the ICs you need to expand your IBM PC memory. Install these yourself in the mother-board or an expansion board. Our prices are often half that of retail stores. Our quality is second to none.

We sell other memory ICs
27128, 2764, 6264 etc
We sell only ICs

MasterCard VISA or UPS CASH COD
Factory New, Prime Parts
MICROPROCESSORS UNLIMITED
24 800 South Platte Ave
BR (GGS) JR 74421 (918) 267-4961

Prices subject to change. Please expect higher prices on some parts due to world wide shortages. Can for volume prices. Subject to customer's shipping & insurance extra. Cash discounts from invoice. Federal Express Standard Air - \$5.00. Orders received by 4 PM CST can be delivered to you by the next morning. We ship hard.

Educational Software!

Lowest Prices,
Professional Help!

	List	Our Price
Koala Pads Apple II	124.95	86.95
with-Micro-Illustrator Atari,		
Vic 20, Commodore 64	99.95	72.95
Mastertype Apple II, Atari,		
Commodore 64	39.95	29.95
Bankstreet Writer Apple II,		
Atari, Commodore 64	69.95	44.50
Story Machine Apple II,		
Commodore 64, Atari, IBM	34.95	21.95
Snooper Troopers Apple II,		
Commodore Disk/Car,		
Atari D/Car	44.95	31.50
HBJ SAT Prep Apple II, IBM,		
Commodore 64, TRS 80,		
Atari	79.95	55.95
In Search of the Most		
Amazing Thing IBM-PC,		
Apple II, Commodore, Atari	39.95	27.95
Early Games	29.95	21.95
Add 5% or 2.00 min for Shipping and Handling.		
Cal. residents add 6.5% Sales Tax		
Visa and Mastercard accepted		
Call/write for free catalog		



Learning Lab

9003 Reseda Blvd., Suite 205-A
Northridge, CA 91324 (213) 701-9438

CIRCLE 353 ON READER SERVICE CARD

SAVE UP TO 50% ON Floppy Disks & Computer Supplies

We Discount the Top Brands
3M-Scotch® • Verbatim® • Dysan
Memorex® • BASF • Maxell®
TDK • Ultramagnetics

We also stock

Ribbons • Paper • Labels
Cleaning Kits • Printwheels
Storage Products

Call, write, or utilize Reader
Service for our FREE new
DISCOUNT catalog

LYBEN COMPUTER SYSTEMS

27204 Harper

St. Clair Shores, MI 48081

(313) 777-7780

Offering Reliability and Same Day Service

CIRCLE 334 ON READER SERVICE CARD



Copy Atari 400/800 Cartridges to Disk
and run them from a Menu

ATARI CARTRIDGE-TO-DISK
COPY SYSTEM #69.95

Supercart lets you copy ANY cartridge for the Atari 400/800 to diskette,
and thereafter run it from your disk drive. Enjoy the convenience of selec-
ting your favorite games from a "menu screen" rather than swapping car-
tridges in and out of your computer. Each cartridge copied by Supercart
functions exactly like the original - self booting, etc.

Supercart includes:
COPY ROUTINE - Dumps the contents of the cartridge to a diskette
up to 9 cartridges will fit on one disk!

MENU ROUTINE - Auto loading menu prompts user for ONE key
stroke selection of any cartridge on the disk.

CARTRIDGE - "Tricks" the computer into thinking that the original
protected cartridge has been inserted.

To date there have been no problems duplicating and running all of the
protected cartridges that we know of. However, FRONTRUNNER cannot
guarantee the operation of all future cartridges.

Supercart is a user-friendly and simple to use. **PRICES TAKE NOTE:**
SUPERCART is not intended for illegal copying and/or distribution of
copyrighted software. Sorry!!!

SYSTEM REQUIREMENTS:
Atari 400 or 800 Computer • 48K Memory • One Disk Drive

Available at your computer store or direct from FRONTRUNNER

DEALER INQUIRIES INVITED

TOLL FREE ORDER LINE: (24 Hrs.) 1-800-645-4700/In Nevada or for

questions Call: (702) 786-4600

Personal checks allow 2-3 weeks to clear. M/C and VISA accepted

Include \$3.50 (\$7.50 Foreign orders) for shipping.

FRONTRUNNER COMPUTER INDUSTRIES
316 California Ave., Suite #712 Reno, Nevada 89506 (702) 786-4600

Others Make Claims. SUPERCART makes copies!!!

ATARI is a trademark of Warner Communications, Inc.

Daddy, where do microcomputers come from?



Two informative books to teach your child about the family computer

Growing up in the computer world
will be easier if your child under-
stands computers. And there's no
better place to start than with the
computer that's in your home—and
with the help of these two delightful
books.

Katie and the Computer and
Computer Parade read like children's
story books. Yet each one actually
teaches the basics of computer
operation.

Katie and the Computer traces the
fantastic journey that takes place
after Katie falls into her family's new
computer. Once inside the computer,
Katie finds herself in the imaginary
land of Cyberrnia where she meets
Colonel Byte. The Colonel guides
her on a fulfilled journey that paral-
lels the path of a computer com-

mand. Supplementary information
helps children relate the story to the
actual computer.

Computer Parade is the second
book in the *Katie and the Computer*
series. This time Katie and her
brother arrive in Cyberrnia just in
time for a computer parade—and to
learn how computer music is made.
All along their fanciful journey, the
threesome encounters friendly and
ferocious dragons, computer bits,
eeks and aaks. And of course they're
always on the lookout for program
bugs.

Any youngster age 4-10 will
delight in these books. They're easy
to read and richly illustrated in full
color.

Help your child grow up computer
literate by ordering your copies now.

MAIL TODAY TO:

CREATIVE COMPUTING PRESS

Dept. MA2B 39 East Hanover Avenue, Morris Plains, NJ 07950

Please send me _____ copies of *Katie and the Computer* at \$8.95 each and *Computer Parade* at
\$9.95 each, plus \$2.00 shipping & handling per book. Total Amount \$ _____

☐ Payment Enclosed. (CA, NJ and NY State residents please add applicable sales tax.)

☐ Charge my: ☐ American Express ☐ MasterCard ☐ Visa

Card # _____ Exp. _____

Signature _____

NAME _____ (please print)

ADDRESS _____

CITY _____

STATE _____ ZIP _____

*Outside U.S., add \$3 for shipping and handling.

☐ Check here to receive a FREE catalog of computing books, magazines and guides.

Also available in your local bookstore or computer store.

**For Faster Service,
PHONE TOLL FREE: 800-631-8112**

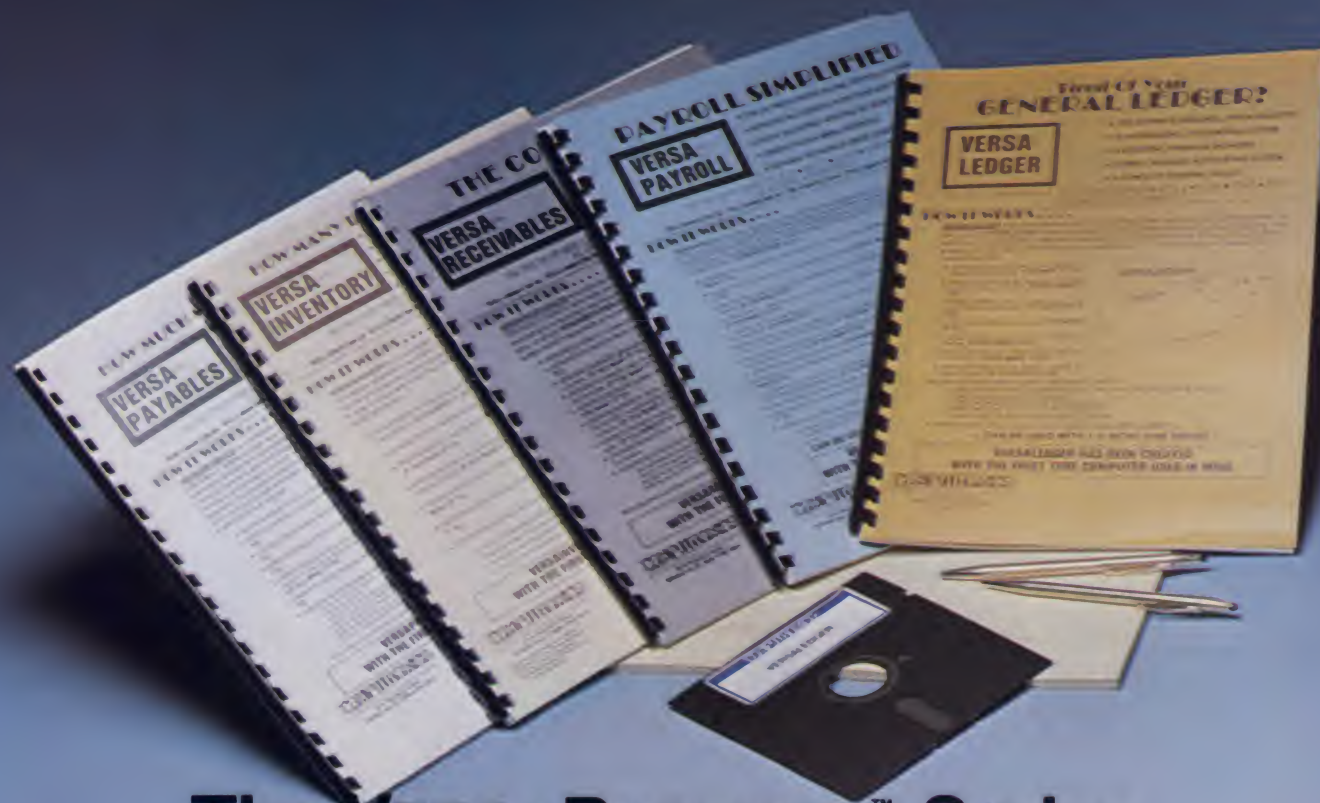
(In NJ only: 201-540-0445)

Index To Advertisers

Reader Service No.	Advertiser	Page	Reader Service No.	Advertiser	Page	Reader Service No.	Advertiser	Page
101	Aardvark	100	153	EPYX	223	180	Okidata	215
	Accent Software	178				279	Opportunities for Learning	198
	ALF Products	205	142	Excalibur Technologies Corporation	11	151	Perfect Software	47
158	Allenbach Industries	224		Fastrack Computer Products	135	218	Popcom	106, 107
102	American Educational Computer	85	164	Franklin Computer Corp	76	201	Prometheus Products, Inc	231
	American Tourister, Inc	97	127	Franklin Mint	48-51			
207	Am Type	199	128	Franklin Mint	61			
208	Analytical Engines	108				152	Quark, Inc	58, 59
	Apple Computer	64, 65	215	Gentech Technology	241	276	Quentin Research	188
						155	Quinset	199
195	BASF	137	129	Handic Software, Inc	235			
103	Beagle Brothers	152	196	Happy Hands	141	156	Radio Shack	92, 93
	Borland	1	131	Hayes Microcomputer Products	24, 25	157	Reader's Digest	162, 163
196	Broderbund	194	150	Hayes Microcomputer Products	140	187	RR Software	35
104	BRS/After Dark	53	132	Heathkit	90			
			133	Hesware	193	159	Howard W Sams	221
122	Calsoft	104	194	Houston Instruments	72	160	Howard W Sams	12
105	Collins International Trading	131				216	Scarborough Systems	38, 39
106	Commodore Business Machines	233	135	IBM Corporation	78, 79	161	Scott, Foresman	197
107	CompuServe	86, 87	136	I.J.G.	150, 151	220	Screenplay	37
130	Computer Advanced Ideas	29	204	Indus	225	165	Sierra On Line	117
109	Computer Discount	254	203	Inmac	238	205	Sierra On-Line	41
112	Computer Exchange	98, 99	202	Interactive Structures	217	162	Sierra On-Line	63
110	Computer Mail Order East/West	156, 157				166	SJB	136
111	Computer Outlet	258	170	Kensington Microware	81	223	Southern California Research Group	250
134	Computronics	Cov 3					Spinnaker Software	26, 27
294	Concord Peripherals	83	172	Leading Edge	Cov 4	167	Star Micronics	213
246	Condore Computer	33	137	Lycor Computer	126, 127	168	Strategic Simulations	69
112	Conroy-La Pointe	98, 99				198	Strobe	171
114	Consolink Corporation	172	138	Mannesmann Tally	143	234	Sub Logic	31
113	Consolink Corporation	173	189	Mann's Vinyl Products	238	257	Sub Logic	219
115	Continental Software	2	206	Maxell	Cov 2	305	SWP	129
116	Cosmic Computer	180	140	MECA	133	169	Systems Mgmt. Associates	244
	Counterpoint Software	13	190	Micro Lab	21			
117	Creative Computing Peripherals	5	141	Micro Management	209	173	Tecmar	7
			193	Micro Sci	77	199	Transtar	103
188	B. Dalton Books	209	174	Monogram	17	236	Transtar	91
119	Data Link	234	176	Mountain View Press	110	241	Turning Point	125
197	Data Most	176, 177	179	Mytek	197	175	Tymac	239
121	Dennison Computer Supplies	15						
120	Dennison Kybe	9		National Education Corp	141	248	Unicorn	36
123	Discwasher	62	192	National Education Corp	249			
			143	NEBS Computer Forms	145	178	Videx	19
214	DJR	228	144	NEC	57			
212	Electronic Arts	159	145	NEC	169	230	Warlock	198
213	Electronic Arts	227	214	Nibble Notch	197	181	Wholesale Technology, Inc.	55
163	Electronic Protection Devices	23	147	Nonagon	114	182	John Wiley & Sons	161
108	Electronic Specialists, Inc	234	217	Northeast Exposition	236			
124	EPYX	134		NRI Schools	113	184	Winner's Circle	132
125	EPYX	95				185	Xerox Education Publications	70, 71
						186	XOR Cor	66

Introducing the Most Powerful Business Software Ever!

FOR YOUR TRS-80™ • APPLE™ • IBM PC™ • OSBORNE™ • XEROX™ • KAYPRO™ • ALL COMMODORE Computers • TELEVIDEO™ • ZENITH™ • SANYO™ • NEC™ • DEC™
TI PROFESSIONAL COMPUTER™ • SUPERBRAIN JR.™ • EPSON™ • Any CP/M™ Computer with 8" Disk Drives
CP/M-based Computers must be equipped with Microsoft BASIC (MBASIC or BASIC-80)



The VERSABUSINESS™ Series

Each VERSABUSINESS module can be purchased and used independently, or can be linked in any combination to form a complete, coordinated business system.

VERSARECEIVABLES™ \$99.95

VERSARECEIVABLES™ is a complete menu-driven accounts receivable, invoicing, and monthly statement-generating system. It keeps track of all information related to who owes you or your company money, and can provide automatic billing for past due accounts. VERSARECEIVABLES™ prints all necessary statements, invoices, and summary reports and can be linked with VERSALEDGER II™ and VERSAINVENTORY™.

VERSAPAYABLES™ \$99.95

VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VERSAPAYABLES™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VERSAPAYABLES™, you can even let your computer automatically select which vouchers are to be paid.

VERSAPAYROLL™ \$99.95

VERSAPAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government-required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally, automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSALEDGER II™ system.

VERSAINVENTORY™ \$99.95

VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

VERSALEDGER II™ \$149.95

VERSALEDGER II™ is a complete accounting system that grows as your business grows. VERSALEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system **without any additional software.**

- VERSALEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
- stores all check and general ledger information forever,
- prints tractor-feed checks,
- handles multiple checkbooks and general ledgers,
- prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

VERSALEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

SATISFACTION GUARANTEED!

Every VERSABUSINESS™ module is guaranteed to outperform all other competitive systems, and at a fraction of their cost. If you are not satisfied with any VERSABUSINESS™ module, you may return it within 30 days for a refund. Manuals for any VERSABUSINESS™ module may be purchased for \$25 each, credited toward a later purchase of that module. All CP/M-based Computers must be equipped with Microsoft BASIC (MBASIC or BASIC-80)

To Order:

Write or call Toll-free (800) 431-2818
(N.Y.S. residents call 914-425-1535)

- * add \$3 for shipping in UPS areas
- * add \$4 for C.O.D. or non-UPS areas
- * add \$5 to CANADA or MEXICO
- * add proper postage elsewhere

DEALER INQUIRIES WELCOME

All prices and specifications subject to change / Delivery subject to availability.

COMPUTRONICS

50 N. PASCACK ROAD, SPRING VALLEY, N.Y. 10977

TRS 80 trademark Tandy Corp. • APPLE trademark Apple Corp. • IBM PC trademark IBM Corp. • OSBORNE trademark Osborne Corp. • XEROX trademark Xerox Corp. • KAYPRO trademark Non Linear Systems, Inc. • TELEVIDEO trademark TeleVideo Systems, Inc. • SANYO trademark Sanyo Corp. • NEC trademark NEC Corp. • DEC trademark Digital Equipment Corp. • ZENITH trademark Zenith Corp. • TI PROFESSIONAL COMPUTER trademark Texas Instruments, Inc. • SUPERBRAIN trademark Intertec Corp. • CP/M trademark Digital Research • EPSON trademark Epson Corp.

CIRCLE 134 ON READER SERVICE CARD

THE DAY THE IBM® PERSONAL COMPUTER BECAME OBSOLETE.



It was a Monday in the autumn of '83.

The day they announced the Leading Edge® PC—a personal computer that's just plain better than the IBM® PC, at just about half the price.

The Leading Edge PC is faster (by more than 50%), more powerful, more flexible and more dependable (for example, our disk drives have a "mean time between failures" of 20,000 hours, versus an 8,000-hour MTBF for theirs). It's compatible with just about all the software and peripherals that the IBM is.

And unlike IBM's, ours comes complete with a high-resolution monitor, controller, seven expansion slots, serial port, parallel port, a time-of-day clock, double the standard memory (128K vs. 64K), plus hundreds of dollars worth of software to get you up and running immediately including MS®-DOS version 1.25, GW Basic, and Leading Edge Word Processing (the most powerful w.p. program ever created to run on an IBM-type personal computer). In short, the basic package comes to you complete and ready to work.

With IBM, on the other hand, you get charged extra for everything. Even for the PC DOS disk that makes



it run (an extra \$40)... and \$170 just for the time of day (a calendar/clock that's standard with Leading Edge). In short, the basic package comes to you as a very expensive paperweight.

It's this simple. The Leading Edge Personal Computer is the first and only serious alternative to the IBM PC... and at only \$2895 for the Leading Edge PC...

Get serious.

In the age of the personal computer, Leading Edge, means what it says.



LEADING EDGE PRODUCTS, INC., 225 TURNPIKE STREET, CANTON, MA 02021, 1-800-343-6833. IN MASSACHUSETTS, (617) 828-8150

IBM is a registered trademark of International Business Machines Corporation.

CIRCLE 172 ON READER SERVICE CARD